ORAL SURGERY, ANESTHESIA HOSPITAL DENTAL SERVICE

MR-1 617.6051
J822

May 1960 · Volume 18 · Number 3

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AMERICAN DENTAL ASSOCIATION

VOL. 18 · MAY 1960 · NO. 3

JOURNAL OF ORAL SURGERY, ANESTHESIA AND HOSPITAL DENTAL SERVICE

Fred A. Henny, D.D.S., Editor
HENRY FORD HOSPITAL, DETROIT

Journal of Oral Surgery, Anesthesia and Hospital Dental Service, Vol. 18, No. 3, May 1960. Published by the American Dental Association, 222 E. Superior St., Chicago 11, Ill. Yearly subscription $10.00 for U. S. and possessions, $12.00 for foreign countries. Single copy $2.00. Entered as second class matter June 21, 1943 at the post office at Chicago, Ill., under the Act of March 3, 1879. Published bimonthly.
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The Journal of Oral Surgery, Anesthesia and Hospital Dental Service is indexed in Index to Dental Literature, Index Medicus and the Hospital Literature Index.

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Volume 18 • May 1960 • Number 3 J. ORAL SURG., ANESTH. & HOSP. D. SERV.

Oral cancer: the role and responsibility of the dentist

■ *Walter William Dalitsch,* M.D., D.D.S., Lake Bluff, Ill.*

Dentists have an important role in the early diagnosis of oral cancer. The dentist, more than any other member of the healing arts, sees patients regularly, and is in an excellent position to detect any changes which may be indicative of malignant transformation. The "Natural History of a Cancer Case" consists of Stage I, the inception when cells begin growing without restraint; Stage II when signs and symptoms disturb the patient and he seeks advice from the doctor; Stage III when a diagnosis is made and finally Stage IV, treatment. Much attention should be given to prevention by elimination of mechanical irritation, vitamin deficiencies, smoking, etc. Areas of leukoplakia should not be casually considered. The lay public should be educated in self-examination of the oral cavity.

"Death enters by the mouth" is an old saying that is frequently true when speaking of infections[1] or intoxications, but it is especially applicable when considering the subject of oral malignancies.

Certainly there is no place in the body that is more accessible to complete examination than the mouth cavity. Therefore, early discovery of cancerous and precancerous changes is possible and comparatively simple. Nevertheless, the incidence of cancer of the mouth and deaths from such cancer are increasing.

The responsibility for detecting and preventing intraoral cancers falls chiefly on the dental profession. This responsibility becomes heavier as the incidence of cancer rises.

The dentist may be described as being in the front line in the never-ending fight to find and to control this dreadful affliction of mankind. By the very nature of the daily practice of his profession he is in a singularly effective position to aid in decreasing the death rate from cancer.[2] He sees his patients frequently and he sees them at regular intervals. He may well be likened to an advance scout who first detects the enemy and then ascertains the foe's location, strength and character.

To bring this problem home, each one may ask himself: How many of us or our family or our friends will get cancer? How many of these will die of cancer?

Although statistics from different studies will vary, it may be stated that one in four will get cancer,[3] and of those having cancer, one will be rescued by treatment, one will die who could have been saved by earlier and more adequate therapy, and two will die regardless.

What proportion of cancer occurs in the dental field? Probably 15 per cent[4] of all cancers are located in the head and neck region, 10 per cent being found in the oral cavity.[5] Almost 8,000 deaths annually are the result of cancer of the mouth. Thus 2,000 of these patients could have been saved if presently available methods of education, detection and treatment were utilized more effectively.

■ *History of a Cancer Case*

It would seem of interest to consider what is the usual course of events occurring in a case of cancer. This might be called:

"The Natural History of a Cancer Case" (see tabulation).

First, there was a "beginning," which may be termed the "Inception" and will be labeled Stage I. At that precise time, growing cells of tissue probably cast off controls of reproduction, gave up duties of physiological function and assumed the unbridled activity of unrestrained multiplication and invasion of adjacent normal tissues. This phase may have been developing for some time before enough progressive alteration in morphology or function developed to the point of inciting perceptible symptoms in the patient's well-being or before producing detectable signs in tissues or organs.

When such symptoms or signs disturb the patient sufficiently or are noticed by an alert doctor, the patient comes for help. This point in the life story of a cancer case may be termed Stage II.

Now, if the patient is intelligently familiar with the possibilities of cancer-occurrence, and if the examining doctor is cancer conscious, a diagnosis may be made. The term "doctor" is used in the broad sense of meaning a practitioner in the art of healing, whether he be physician or dentist or other exponent of such profession. Both doctor and patient, if properly alerted, will seek for the lump that indicates a new growth, for the "sore" that does not heal, for unexplained and persistent bleeding or discharge, for an unusual change in a previously existing "benign" growth, for disturbances of function, such as difficulty in swallowing, prolonged cough, hoarseness, dysphonia, and stomach or bowel difficulties. These are the classical danger signals and must be suspected of evil unless they can be explained otherwise.

But, all too often there is a delay between the first inception of the disease and the presentation of the patient for diagnosis,[6] Stage III. Whatever the reason for delay—fear, ignorance, lack of pain or discomfort, wrong advice—precious time has been lost which spells the difference between kill and cure.

At this time the doctor must use all means available to prove or disprove the existence of cancer. Physical diagnostic methods, thorough inspection systematically made of every portion of the oral cavity and adjacent areas with good lighting and adequate access to every surface are essential: the lips, the vermilion border, the mucocutaneous margins; the labial and buccal mucous linings; the

Table • The natural history of oral cancer

Stage I.

"Precancer"
- Irritations:
  - Chemical (anthracenes)
  - Mechanical (trauma)
  - Infectious (chronic lues)
    (chronic Vincent's)
  - Thermal (heat)
  - Radiation (actinic)
    (beta, gamma, nuclear)
  - Dietary (anemia)
    (bleeding)
    (cheilosis)
    (perleche)
    (glossitis)

"Benign" lesions
- Leukoplakia (smoking)
- Self-examination (patient education)
  (regular check-up examination)

Prevention of cancer
- is possible at this stage

Stage II.

Inception (onset)
- "Invasion"
- Signs and symptoms
  - Hardly detectable
  - Pain absent or minimal
  - Progress is insidious (like caries of teeth)
  - "Lump"—persistent
  - "Sore"—does not heal
  - Bleeding
  - Discharge
  - Change in old "benign" growth
  - Alteration in function:
    - swallowing
    - chewing
    - breathing
    - special senses
  - Cough
  - Hoarseness
  - Dysphonia (voice)

Delay here is all too common!

Stage III.

Discovery and Diagnosis
- Presentation to doctor
- The first doctor who sees the cancer case has the patient's life in his hands.
- History
- Physical examination:
  - inspection
  - palpation, etc.
- Biopsy—repeat if necessary
- Blood studies
- Cellular examinations (Papanicolaou stain)
- Exudate
- Serology
- Roentgenographic studies

Incomplete examination
- failure to make definite diagnosis
- failure to institute prompt and adequate treatment

These factors may spell the difference between kill and cure.

Stage IV.

Treatment
- Surgery of lesions
  or regional lymph node areas
- Radiation
  - roentgen rays, radium, radon
  - betatron
  - isotopes (cobalt 60)
- Chemotherapy
- Systemic
- Palliative
- Reconstructive
- Complications and sequelae

ducts and orifices of the salivary glands; the tongue, its tip, its edges, especially the posterior aspects of the lateral margins of the dorsum.

To make this examination properly, the tongue tip must be thrust out and grasped by the examiner's fingers, then drawn first to one side and then the other to disclose the extreme base. Then the palate, both hard and velum, the alveolar coverings, the tonsils and pillars, and even the oral and nasal pharynx, are examined. A dental or laryngeal mirror will permit inspection of the supravelar and epiglottic regions. All these regions should be inspected regularly whenever a complete check-up examination is made.

Palpation is the next important maneuver. First the tips of the fingers of one hand are used. The doctor must be sure

to "feel" all the areas mentioned as they are being looked at. The consistency of the tissue must be determined and any variation from adjoining normal structure, whether it is firm, hard, indurated, whether it is demarcated along its margins or infiltrated, and whether it is fixed to overlying skin or mucosa, or to the underlying organs, muscles or bone. Next bimanual palpation to get the feel of the examined region between two opposing fingers will often give additional information. Thus one finger can be placed on the skin under the chin to displace the floor of the mouth upward and the finger of the other hand in the mouth to learn more of the consistency of the tongue, glands, swellings, and so on. In addition, the doctor should palpate similarly the tonsillar fossae and the retrovelar and supravelar regions. The regional lymph nodes—submental, submandibular, preauricular and cervical—likewise should be examined. Even percussion is helpful in eliciting tenderness over a diseased sinus or in attempting to "trigger" a neuralgic manifestation.

At times auscultation may be useful as when an aneurysmal condition is suspected in the mouth, pharynx or neck.

The presence of odors should always be determined. Some of these smells are characteristic, and a good diagnostician will utilize his educated olfactory sense to advantage.

Certainly any and all suspicious lesions must be examined microscopically. A good biopsy specimen taken from the proper site is invaluable but not always conclusive. If history and clinical data disagree with a negative biopsy report, additional examinations are indicated. A biopsy which signifies that a lesion is benign at one time is not insurance that malignant changes may not develop at a later stage. Thus it may be necessary to do repeated and subsequent check-up biopsies.

Other laboratory work-up is of value. Blood tests and hematologic studies, aspiration of fluid-containing swelling, vital staining of cellular smears and washings as used in the Papanicolaou methods, roentgenograms of bony and soft structures, dental films—occlusal films, at times using opaque and displacing contrast media technics—these should all be kept in mind and utilized when indicated.

With such a planned examination, a diagnosis may be arrived at. No patient should be dismissed or assured that he is safe unless positive evidence will substantiate a negative finding. Again, one examination may be fruitless, but subsequent follow-up and check-up procedures should be urged.

It is worth emphasizing that the first doctor who sees the cancer case has the patient's life in his hands. The final outcome, whether cancer will kill or be controlled, depends on that first doctor making a definite early diagnosis and instituting adequate treatment without delay.

Then comes the next phase, Stage IV, in the life story of a cancer case, namely: treatment. Treatment may mean excision of the malignant growth, if seen early, followed by complete cure. If seen at a later stage, it means excision of the primary tumor together with a removal of regional lymph nodes which may be the site of secondary growths. If progress of the tumor is rapid or if delay is prolonged, such surgery often is mutilating and

promises a doubtful end-result. It is true that with modern technics of anesthesia and surgery, extensive procedures can now be accomplished with a low mortality rate, but the very magnitude of widely "separating the patient from his tumor" leaves such a change in function and appearance that it is often questionable whether the few remaining days of life are worth living.

Radiation therapies have a definite place in a treatment program. The use of these modalities, whether roentgen ray, radium, betatron, or radioactive isotopes, calls for expert and careful evaluation as to the type of tumor (whether radiosensitive or resistant), the age and condition of the patient and whether surgical excision is inadvisable.

Chemotherapy has strong advocates, although it is not used often, and again it requires expert technics in application and regular and meticulous check of tissue specimens.

■ *Prevention*

Probably the most hopeful aspect of the whole cancer control problem is prevention. Whereas active treatment of the established disease often requires heroic procedures and yields uncertain results, preventive measures frequently are definite, clearly indicated, easy to apply and happily rewarding.

If all that is known to be of significance in the avoidance and correction of carcinogenic factors were followed faithfully, the reduction in cancer occurrence would be more gratifying. Doctors should be familiar with those aspects of environment, habits and constitution of their patients which might have a bearing on the development of cancerous conditions.

Some of the influences which may predispose to the development of cancer will be considered briefly, those which the doctor is in a position to correct or remove.

Certain irritant substances have a recognized carcinogenic effect; namely, the anthracenes resulting from the combustion of petrol products and of tobacco. Much is heard today about the rapid increase in pulmonary cancer, especially in men. There is evidence that a relationship exists between the prolonged habit of smoking and lung cancer. A similar suspicion must be entertained in regard to smoking as a cause of oral cancer. On a clinical basis, the evidence is fairly definite.

Additional factors may be: mechanical irritation, neglected oral hygiene, repeated trauma, thermal insults (hot soups, hot coffee), prolonged inflammatory and infectious states; for example, untreated lues causing chronic glossitis is a frequent forerunner of tongue cancer. Certainly the sex of the patient must be considered when it is realized that a high proportion of cancer of the mouth occurs in men. In recent years, however, the rate is increasing in women, probably because more women are now beginning to reap the results of prolonged and excessive smoking. A generation back it was the exception to see a female smoker, and it was also the exception to see oral malignancy in a woman.

Age, of course, has an influence and doctors must learn to give older patients more time and study, and a more thorough evaluation. Too often the older person wants to be left alone, too often he puts

off seeking consultation. He doesn't like to be bothered, doesn't want his habits changed. Many times he is edentulous and therefore does not come to the dentists regularly (twice a year). Oral hygiene is neglected. Dietary and vitamin deficiencies such as scurvy, pellagra and anemia are more common. These result in long standing perlèche, cheilosis, glossitis, dermatitis and bleeding. Vascular sclerosis and circulatory changes normally are present. Healing responses are slow. The long years of cumulative irritation, whether chemical, thermal or traumatic result in tissue changes of scarring, leukoplakia and malignant degeneration.

This field of gerodontics requires more intense consideration. From the point of view of cancer prevention, such consideration on the part of the dentist can yield a rich reward. This is the age level where cancer of the mouth is most prevalent. This is the age group which can be helped most by preventive efforts.

Radiation effects, whether from sunlight, x-ray machines or radioactive substances, are potent forces causing peculiar tissue changes that may lead to cancer. Sunlight (and how popular it is to sit in the sun and get toasted—no vacation is complete without a deep coat of tan) along with drying and wind exposure can lead to the basal cell types of skin tumors. Light complexioned individuals are most susceptible.[7]

The vermilion borders of the lips should be inspected regularly for signs of an irregular demarcation of the mucocutaneous margin, leukoplakia changes, fissuring, bleeding and ulcerations. These are all danger signals warning that trouble in the form of lip cancer lies ahead.

Radiation injury from roentgen ray (gamma ray) may result from diagnostic, occupational or therapeutic exposures. With the increasing use of radioactive substances (alpha and beta) in industry and medicine, the possibilities of injury, of poisoning and of subsequent malignant development are greater. Doctors should be aware of the fact that the long-acting by-products of fusion reactions (H-bomb detonations) – for example, radioactive strontium—can gain entrance to the body through contaminated food and water, can have prolonged cumulative effects, and can produce evidences of radioactive poisoning and tumors (bone sarcoma).

Specific changes in the oral tissues are found in such cases of poisoning. Isolated decalcification of tooth structure called "focal necrosis" and mixed sclerosis and porosis of bone (radiation osteitis) are so characteristic as to be almost pathognomonic of radioactive poisoning.[8] This syndrome is sufficient evidence to permit the making of a diagnosis on roentgenographic appearance alone. Again, awareness and early discovery of such signs can give warning so that efforts can be directed toward prevention.

No discussion of cancer prevention and early recognition is complete unless the importance of the condition known as leukoplakia is considered.[9] This is one important danger signal frequently seen by dentists. Often spoken of as a "precancerous" lesion, I feel that it should bear that label unless and until it can be proved to carry a less serious import. Leukoplakia is a clinical designation and literally means a white patch. Thus it may merely mark the scarred site of a former injury. But it may also be the early

warning of a continued, repeated and persistent irritation which leads to progressive degenerative changes.

Leukoplakia appears in other body orifices—the cervix, anus, vaginal tract, bladder, esophagus and larynx. But in the mouth its discovery is of great importance because it can be detected so easily and so early. Thus its discovery may provoke the institution of active measures of treatment, and a cancerous development may be prevented. If it cannot be eliminated and if it progresses, it must be concluded that it is a precancerous change and must be observed and treated as such.

In the treatment of leukoplakia, all possible contributing factors should be corrected or removed. Oral hygiene should be maintained meticulously. Local and systemic infections must be controlled. Chronic lues and continued fusospirillar infections should be treated adequately. It has been aptly stated that "In a large majority of cases, cancer is a disease resulting from disease; it rarely occurs in previously healthy tissue."[1]

Smoking should be forbidden. Tobacco chewing and the continuous holding of snuff in the labial fold should be interdicted. Tobacco users are not mindful of unhygienic mouth conditions. Whereas a nonsmoker would be uncomfortable if he detected food debris around his teeth; a discolored stain on his teeth or tongue and an offensive odor to his breath, the smoker is not disturbed by these usual accompaniments of his habit. He likes the after-taste of a cigarette and he is reluctant to remove it by postprandial cleansing. Consequently there is a prolonged exposure to food debris and bacterial growth, plus a persistent contact with precipitated tarry distillates from the tobacco.

As a result of this environment, it is not unusual to find chronic Vincent's infection with frequent acute exacerbations,[10] resulting in the development of leukoplakia.

Little will avail in the treatment of leukoplakia (and cancer) if the use of tobacco is not stopped. The warning to a patient must be definite, direct and emphatic. He must be told he must stop immediately, not tomorrow or after the holidays. He must understand that he must stop completely all use of tobacco, not "tapering off" or just smoking half a cigarette. He must be told that he must stop permanently, not that, if the condition improves, he can resume the habit. He must understand thoroughly that his leukoplakia may lead to cancer if the causative factors are not removed. The doctor, and he, cannot afford to gamble with "filters" or "not inhaling" or other half-way subterfuges. This game is being played with a killer, and the stake is too high to permit any temporizing evasion.

Will the patient worry and get depressed with cancerphobia? The hope is that he will be sufficiently concerned to comply strictly with the doctor's advice. If fear is present it is not nearly as serious as is the panic if full-blown cancer were discovered. Nor is the depression nearly as severe as the patient faces when he looks into the mirror after a mandibulectomy or similar mutilating surgical procedure.

The surgeon who insists that his cancer patients can never be dismissed permanently but must return for periodic observation for the balance of their existence has the right attitude. This doctor is not

concerned merely with the possibility of recurrence of the first tumor, but with continual education of the patients, and regulation of their ways of living in order to prevent other additional malignancies.

How can patients be educated to an awareness of cancer as a possible harmful foe? Self-examination is one of the best ways.

Self-examination of the mouth and neck region as a method of discovering early cancer is just as practical as it is in the detection of breast cancer. During the last five years eight million women have been shown educational films depicting a simple method for self-examination of the breasts. This public education program has proved definitely worth while in detecting early breast cancer and helping to reduce mortality from this disease.[11]

Promotion of a similar public education activity for teaching self-examination of the oral cavity is needed and should be directed to the public in general, both men and women. It should be aimed especially to those who do not see their dentists regularly. It should apply particularly to the middle and older age groups. In teaching this self-examination, the patient should look in a mirror while the dentist points out the important areas to be examined. The patient should be shown any evidence of irritation or beginning disease that may require close observation. He should be taught a systematic routine for inspecting the mouth; the lips, cheeks, palate, tongue, pharynx and neck. The desirability of regular professional observation and of periodic roentgenographic studies should be stressed. It should be pointed out that cancer is as insidious as dental caries—a small beginning, a hidden lesion, can grow quickly to serious proportions with little or no warning. It must be emphasized that it may be fatal to wait until symptoms develop.

This procedure of self-examination of the oral cavity could well be practiced in our own mouths.

In this self-inventory, doctors should also be on the lookout for other danger signals elsewhere in the body. Persistent cough, chronic hoarseness, stomach disturbance, unusual change in intestinal function, rectal and anal irritation, bleeding, breast and uterine abnormalities should be matters of concern calling for immediate investigation.

In the examination of children, it must be remembered that malignant growth can occur at an early age.[12] Because of the general impression that cancer of the mouth is only a disease of adult life it may be overlooked in children. Although infrequent, such cancer does occur and when it does, it is often in a rapid and severe form.

The same danger signs of a persistent nodule, a progressive enlarging mass, ulceration or sore that does not heal and unexplained bleeding, if not traced to a dental cause, should make one suspicious of neoplastic origin.

■ *Summary*

Cancer of the mouth, statistically and vitally, is an important aspect of the cancer problem.

The early detection and prevention of oral malignancy are chiefly the responsibility of the dental profession. The incidence of head and neck cancer is high and is steadily increasing. Probably one fourth of the deaths resulting from cancer

in the mouth region could be avoided by early diagnosis and adequate treatment.

The dentist is in a singularly effective position to bring about a decrease in the death rate from oral malignancies. The dentist can do much good by removing and correcting irritating factors which predispose to the development of leukoplakia, precancerous or cancerous lesions.

Tracing the natural history of a cancer case reveals the need for early discovery and definite diagnosis. The implications of leukoplakia and other "precancerous" changes must be evaluated properly. Early signs of oral cancer must be recognized. Differentiation from benign growths and infectious processes is to be made. The role of neglected hygiene, the long continued and excessive use of tobacco, and the harmful effects of radiation must be considered.

Methods of physical examination and diagnostic procedures are outlined. Diagnosis requires the proper use of clinical and laboratory aids.

Self-examination promoted as a public educational program has proved an effective method of helping the laity discover danger signs, detect beginning cancer and seek early professional advice. This plan of self-examination can be equally successful when applied to the oral cavity.

The dentist should be alert to recognize suspicious lesions occurring in adjacent areas around the face and neck which may come under his observation.

The possibility of oral cancer in children should not be overlooked.

As a representative of a healing profession the dentist should have knowledge of the danger signals of cancer in other parts of the body.

Cognizance of the various phases of the cancer problem, thoroughness of examinations, elimination of possible etiologic and predisposing factors, definite and adequate treatment of early lesions, are all essential aspects of the dentist's important part in furthering the control of this scourge of mankind.—325 *Sylvan Road.*

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Current therapy of oral cancer

■ *Irving Meyer,* D.M.D., D.Sc., Springfield, Mass.*

The current methods of therapy for oral cancer are presented in a concise, direct manner. In the author's opinion, management of this disease requires a team approach. Cancer of the lip treated with irradiation or surgery has been relatively successful. Primary carcinoma of the tongue may be treated best by a combination of surgery and irradiation, or either may be used alone. The surgical treatment may range from local excision of a small lesion to a "commando" procedure, with resection of the mandible. If irradiation is used, the total dose may range from 6,500 r to 9,000 r. Treatment of these lesions in other anatomic locations such as floor of the mouth, buccal mucosa, palate, maxilla, mandible, and salivary glands, is described. The use of palliative therapy is mentioned and indications for radical neck dissection and the use of irradiation are presented.

Current treatment of oral cancer is based on the use of interrelated skills. When the diagnosis of carcinoma of the oral cavity has been established, the clinician calls on the surgeon, the pathologist, the radiologist, the internist, the anesthetist, the dentist, as well as other specialists; this is essentially the same procedure followed in a tumor clinic where these men are available in a group. The field of cancer therapy has broadened to include more than one individual's skills, and has evolved to a "team" approach to the problem.

The oncologist has a number of methods of treatment available in his armamentarium. These include surgery, radiation, surgical treatment combined with radiation, hormones, chemotherapy, and so on.

Surgery may range from the local excision of a malignant tumor to a radical en bloc resection to include the primary lesion, the mandible, cervical lymph vessels and nodes, blood vessels, nerves and muscles. Electrosurgery, such as the coagulating ball or the Franseen disk electrode, is another surgical technic which has good usage in certain types of lesions. Although a localized oral lesion can be managed by an oral surgeon, oral malignancies involving extensive resection and neck dissection are treated by a team.

Radiation therapy includes the standard therapeutic 200 KV - 250 KV machines, 2 million volt type apparatus, cobalt 60, radium needles, gold seeds, and radon needles. The choice of which method is to be used varies with the type and location of the neoplasm, the available apparatus, and the individual radiotherapist's judgment. In many cases of radiation therapy, the bone of maxilla and mandible must be protected by shielding

Fig. 1—Left: Clinical view showing extensive carcinoma of lower lip which has extended to involve the commissures and mandible. Cervical lymph nodes are bilaterally involved. Right: Patient after radical excision of lower lip and anterior two thirds of mandible. Defect has been closed by sliding cheek flaps together in midline. Bilateral neck dissection has been done to eliminate involved lymph nodes

with sheet or plastic lead in order to prevent osteoradionecrosis.

A combination of radiation therapy and surgery is frequently the method of choice. Although generally either a surgeon or a radiologist, the oncologist must be familiar with the use of both methods of treatment.

■ *Treatment by Anatomic Regions*

LIPS—Carcinoma of the lower lip is the most common of all oral cancers and may be treated by either radiation or surgery.

Radiation therapy by external cone technic produces excellent results in cancer of the lower lip. The tissue doses range from 6,000 r to 7,000 r and are administered in fractionated doses extending over a period of from several days to several weeks. The results of radiation treatment of both small and large lesions of the lower lip where cervical lymph nodes were not involved have been most favorable and the number of patients who have survived five years is in the vicinity of 90 per cent.

Surgical treatment of carcinoma of the lower lip may vary from a simple wedge excision of a small 1.0 to 2.0 cm. lesion, to the Estlander procedure consisting of bringing a flap from the upper lip to fill the surgical defect in the lower lip after excision of a lesion 2.0 cm. or larger, and finally to the Daland operation where the entire lower lip is excised and closure is effected by sliding flaps from both cheeks together in to the midline. Both the Estlander and Daland procedures frequently require subsequent cosmetic surgery (Fig. 1). When the mucous membrane of the lip adjacent to the lesion is clinically of poor quality, a "lip shave" is combined with the wedge type of excision.

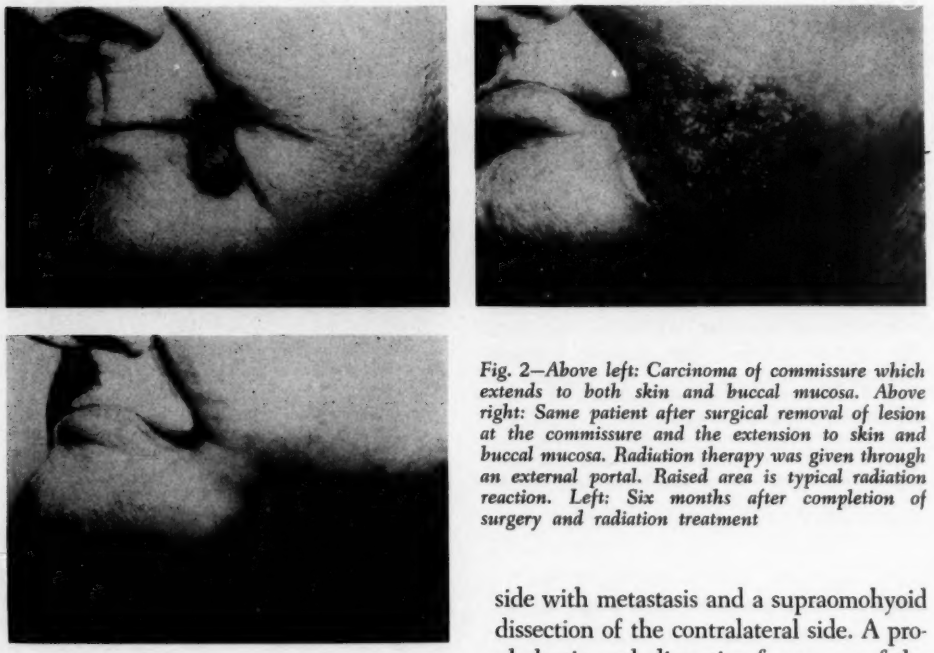

Fig. 2—Above left: Carcinoma of commissure which extends to both skin and buccal mucosa. Above right: Same patient after surgical removal of lesion at the commissure and the extension to skin and buccal mucosa. Radiation therapy was given through an external portal. Raised area is typical radiation reaction. Left: Six months after completion of surgery and radiation treatment

Carcinoma of the upper lip is treated in essentially the same manner as a lower lip lesion, but does not have as good a prognosis. The occasional adenocarcinoma of the upper lip must be surgically removed. The wedge excision and the Estlander procedure are the surgical technics most frequently used for upper lip cancer.

Commissure lesions are best widely excised and closed using a plastic technic. Frequently they extend to involve buccal mucosa and require excision of the commissure together with the buccal mucosa; this is frequently followed by intraoral cone roentgen therapy (Fig. 2).

Metastatic lymph nodes from either upper or lower lip, which are usually ipsilateral, are treated by radical neck dissection of the involved side. Some clinics advocate a radical neck dissection of the side with metastasis and a supraomohyoid dissection of the contralateral side. A prophylactic neck dissection for cancer of the lip generally is not indicated.

TONGUE—Carcinoma of the tongue is a difficult problem in management because of its relatively unfavorable prognosis; this becomes even more unfavorable if cervical lymph nodes are found to be involved by metastasis. World statistics for the results of treatment of carcinoma of the anterior two thirds of the tongue range between 20 per cent to 30 per cent for five year survival without recurrence.

Many clinics use a combination of intraoral and extraoral roentgenotherapy to control a primary carcinoma of the tongue. Others, who are adept in the use of interstitial radium needles, have obtained excellent results by implantation of these low intensity radium needles made of platinum. These needles measure

15 to 30 mm. long by 0.5 mm. in wall thickness and are placed directly into the tumor bed in a specific pattern so as to obtain maximum irradiation of the area. Because they are left in position for 7 to 10 days, they may cause the patient considerable discomfort.

A newer method of irradiation of tongue cancer consists of sewing cobalt pellets within a nylon thread directly into the tumor and its surrounding tissues.

The total dosage delivered to a tongue cancer varies from 6,500 r to 9,000 r. All teeth in line of radiation, whether cariously involved or not, should be prophylactically removed and a radical alveolectomy done; this helps prevent subsequent osteoradionecrosis of the jaws. Whenever possible the bone should be protected by lead shielding.

Surgical treatment may range from a local excision of small tongue cancer to a hemiglossectomy done in continuity as part of a radical neck dissection with either a "pull-through" procedure, or a "commando" with resection of the mandible. The latter method ("commando") is generally favored by the surgically-minded oncologists. Occasionally it is possible to split through the midline of the lip, section the symphysis of the mandible, perform the hemiglossectomy, and then repair the mandible with stainless steel sutures; this cannot be done if the tumor has invaded the floor of the mouth and has encroached on the mucosa adjacent to the bone.

The question of doing a neck dissection whether or not palpable lymph nodes are present has been argued back and forth. Because of the very high percentage of histologically positive lymph nodes which were not palpable and were found by prophylactic neck surgery, it is our policy to do either an en bloc radical neck dissection, mandibulectomy, and hemiglossectomy, or to control the primary lesion with radiotherapy and do either a therapeutic or prophylactic neck dissection. Other clinics prefer to wait after controlling the primary growth until a probable metastatic node is palpated before doing the neck surgery.

FLOOR OF MOUTH—Cancer of the floor of the mouth is another difficult lesion to treat. The surgical approach requires excision in continuity of the floor, the adjacent area of the tongue, the mandible, and a radical neck dissection. On occasions a "pull through" procedure for removal of a smaller lesion sufficiently distant from the bone may be done in continuity with the neck dissection to avoid resecting the mandible. Another variation is to split the lower lip and jaw in the midline, complete the excision of the primary lesion together with the neck dissection and then repair the mandible with stainless steel wire sutures much in the manner of an open reduction of a fractured jaw. Because the lymphatic drainage of the region is very extensive and often bilateral, only in very rare instances will a simple local excision of a carcinoma of the floor suffice. Indeed, it is often necessary to do bilateral neck dissections, because of the cross drainage of these lymphatics.

Radiation therapy is the treatment of choice. Whenever possible intraoral cone therapy, supplemented with radiation directed through external portals, is used to control the primary lesion. Low

intensity radium needles implanted in the lesion will deliver excellent interstitial radiation to the lesion and its surrounding soft tissues. A major complication of both interstitial curietherapy and roentgenotherapy is the development of osteoradionecrosis of the mandible, but this can be dealt with once the lesion is controlled.

If cervical lymph nodes are palpable and if there is hope of salvage, a neck dissection must be done. The use of prophylactic neck dissection after radiation control of the primary lesion also has its advocates and its detractors. Because of the relatively high percentage of positive nodes found in patients without apparent metastasis, it is our feeling that prophylactic neck dissection is indicated. Where the lesion is either in the midline or encroaches on it, a modified radical neck dissection of the opposite side combined with a radical neck dissection of the same side or bilateral radical neck dissection should receive the utmost consideration.

BUCCAL MUCOSA—Carcinoma of the buccal mucosa may be treated by either surgery or radiation. Smaller lesions should be either excised or electrodesiccated. Larger lesions ranging from 2.5 cm. to 4.0 cm. in diameter, but not involving adjacent structures, may be excised and the area covered with a skin graft. The surgical treatment of a very large carcinoma of the buccal mucosa which has extended to the adjacent structures is radical resection together with the mandible or maxilla, followed by a neck dissection. These patients frequently must have subsequent extensive and prolonged plastic surgery.

Roentgen treatment administered through intraoral and external portals has been effective in the therapy of both small and large carcinomas of the buccal mucosa. After control of the primary lesion, radical neck dissection should be done as a therapeutic measure for palpable lymph nodes. Prophylactic neck dissection may depend on whether the lesion is the exophytic type, which has a relatively good prognosis, or is the ulcerating (endophytic) type, which has a much poorer prognosis. In the former waiting may be justified, whereas in the latter a prophylactic neck dissection usually is indicated.

PALATE—Carcinoma of the hard palate is usually of the mucous or salivary gland type; less frequently an epidermoid carcinoma occurs. Surgical extirpation is the treatment of choice and the palatal bone overlying the tumor should be included as well as an adequate margin of normal mucoperiosteum. This frequently results in a permanent nasooral, or oroantral fistula, both of which may be covered later with a dental prosthesis (Fig. 3).

Radiotherapy usually is reserved for palliation of inoperable hard palate lesions.

Metastatic lymphadenopathy from a hard palate tumor should be treated by radical neck dissection. The palatal lymph drainage may cross in the midline of the palate and result in contralateral metastasis; this requires bilateral neck dissection.

Cancer of the soft palate is often closely associated with the tonsil; hence, it is necessary to include a tonsillar extension of the tumor in the consideration of therapy (Fig. 4). Through a combination of extraoral and intraoral portals, radiotherapy is the most effective treatment for

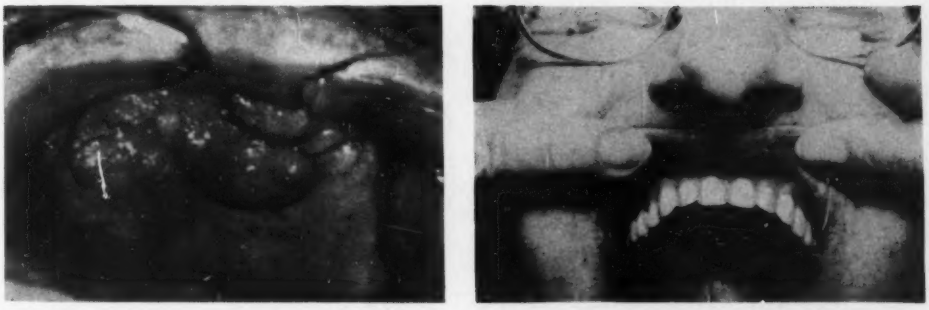

Fig. 3—Left: Carcinoma of anterior hard palate and alveolar ridge. Right: Maxillary denture with an obturator has been used to close surgical defect

the primary lesion. Metastasis is usually to a lymph node just below and under the angle of the mandible; this adenopathy is included in the region covered by the field of radiation.

Because of the difficulty in defining the extent of the tumor and thus in obtaining an adequate margin around it, surgery is not the method of choice for the treatment of a carcinoma of the soft palate. However, a radical neck dissection for cervical adenopathy is done frequently when the primary lesion has been controlled by radiation.

MAXILLA—Surgical treatment of carcinoma of the maxilla and its gingiva is the method of choice and usually includes the alveolar bone and floor of the maxillary sinus (Fig. 5). Electrosurgery is also used effectively to destroy a surface lesion and the immediate underlying bone. If the tumor is too extensive to excise through the intraoral route, it may be necessary to use an external approach consisting of an incision through the midline of the lip, around the ala nasi, and under the orbital margin; reflection of the skin and mucoperiosteum gives

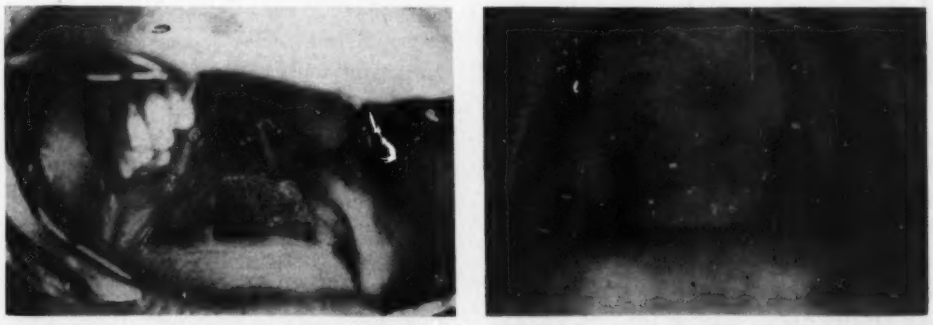

Fig. 4—Left: Carcinoma of soft palate which extends onto mucosa of hard palate. Right: Postradiation of lesion

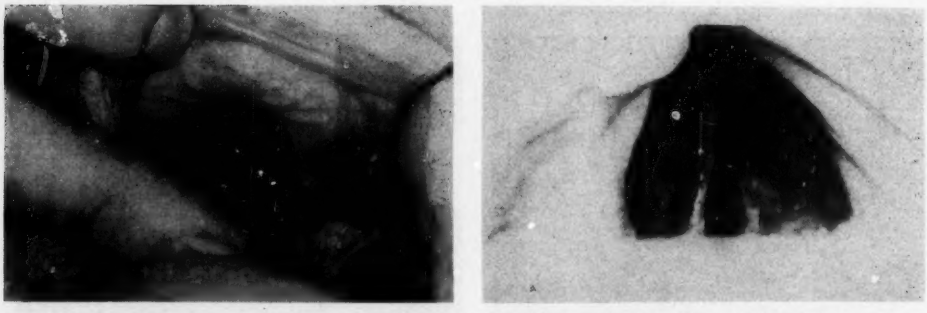

Fig. 5—Left: Carcinoma of gingiva of maxillary alveolar ridge; underlying bone is invaded by cancer. Right: After resection of two thirds of palate and the invaded alveolus. Undersurface of the vomer is shown as is exposed maxillary antrum and floor of the nose. Defect later was covered by dental prosthesis with obturator

wide exposure of the maxilla and permits its removal en bloc.

Radiotherapy frequently is used after surgery. Radiation can be administered to the maxilla either by intracavity (antrum) application of radium needles or by intraoral and extraoral portals.

A therapeutic radical neck dissection is used to eradicate evident cervical metastasis. If there is no clinical evidence of metastasis, most oral surgeons do not do prophylactic neck dissection because of the relatively infrequent metastasis of gingival lesions of the maxilla.

Carcinoma of the maxillary sinus may involve the alveolus, the orbit, the overlying skin, the ethmoid sinuses, the sphenopalatine fossa, and the nasal cavity, and metastasizes readily to the cervical lymph nodes. Neither radical surgery nor radiation have been particularly successful in treating this lesion. Surgical resection of the entire maxilla through an external approach, or intraoral excision of the floor of the antrum followed by curettage of the sinus and placing of intracavity radium needles, have given palliation with an occasional cure. Radiotherapy through a combination of intraoral and extraoral portals has resulted in some cures but its main asset lies in palliation.

Ameloblastoma has a tendency to recur after local excision. When it occurs in the maxilla, a wide resection is in order, and the resulting defect of the palate or antrum may be closed with an obturator prosthesis. Because ameloblastoma is relatively radioresistant, radiotherapy is seldom used. This tumor rarely if ever metastasizes to the cervical lymph nodes; hence, prophylactic neck dissection is not indicated.

Osteosarcoma is rarely seen in the maxilla, but when it occurs, the only treatment with any chance of cure is a wide resection of the area.

MANDIBLE—Surgery is the method of choice in the treatment of carcinoma of the mandible and its gingiva; this may or may not be followed by radiation therapy. Simple block excision of a small well-differentiated malignant tumor with its adjacent alveolar bone and with preser-

vation of the continuity of the inferior border is occasionally employed, but in most instances this is inadequate. Generally speaking a gingival carcinoma invades the bone and requires a resection of the mandible. This usually must be accompanied by either a therapeutic or a prophylactic neck dissection. Superficial verrucose malignant tumors with no roentgenographic evidence of bone invasion may be treated by electrosurgery; the underlying electrodesiccated bone eventually will separate and slough out.

Radiotherapy administered through an intraoral cone may be used for very early noninvasive lesions with no clinically evident metastatic adenopathy. The total dose is protracted over several weeks and may be supplemented by extraoral therapy. Osteoradionecrosis of the mandible is a complication which may result from radiotherapy of these gingival lesions.

Ameloblastoma of the mandible, a locally malignant tumor which may be solid or cystic, is treated surgically. Because these tend to recur when removed locally, some surgeons resect the involved mandible. Others excise the tumor locally and cauterize the bone with chemicals, and then will resect the mandible if there is a recurrence (Fig. 6).

Sarcoma of the maxilla and mandible are rare. Radical resection of an osteosarcoma is the treatment of choice, whereas Ewing's sarcoma is radiosensitive and can be so treated.

SALIVARY GLANDS—Carcinoma of the salivary glands is treated surgically by wide radical excision. In the parotid gland the facial nerve usually is sacrificed during radical resection of a malignant tumor. Radiation when employed is used either postoperatively or for palliation because malignant tumors of salivary glands generally are radioresistant. Metastasis to cervical lymph nodes is treated by radical dissection; lung and bone metastases are not infrequent and are treated with palliative radiotherapy. Hormone therapy has occasionally been successful in palliating lung metastasis of salivary gland tumors.

Fig. 6—Extensive destruction of mandible by multiloculated cystic ameloblastoma

PALLIATION — Palliative therapy is based on the premise of "what will give the patient the most number of comfortable days." Carcinoma of the oral cavity which has progressed beyond the hope of salvage is frequently treated by radiation for palliation. The radiotherapy shrinks

the total tumor bulk and permits the patient a more adequate nutrition. There is a calculated risk in treating cervical metastasis palliatively, because not infrequently the involved nodes liquefy and rupture through the skin. This results in painful, sloughing, draining regions which soon become infected and hasten the patient's death.

In some patients with hopeless oral carcinoma, we have removed the mandible either through an intraoral or an extraoral approach, and then given doses of radiation beyond the limits usually employed. This has given a number of our patients so treated (9 out of 12) palliation which ranged from fair to excellent and has even considerably prolonged the life span of three of our patients.

Alcohol nerve blocks and neurosurgery are used frequently for alleviation of pain when all other methods of pain control such as narcotics have failed.

■ *Summary*

The current treatment for oral cancer is based on the use of interrelated skills. When the diagnosis of carcinoma of the oral cavity has been established, the dentist calls on the surgeon, the pathologist, the radiologist, the internist, the anesthetist and other specialists. The various methods of therapy in the treatment of cancer of each anatomic region of the oral cavity are evaluated briefly.—*40 Maple Street.*

*Cancer division, Westfield State Sanatorium; instructor, departments of oral surgery and oral pathology, Tufts University School of Dental Medicine, Boston.

■ FOOTBALL INJURIES

The face presents the single body area most vulnerable to injury. Here fractured teeth are most common, with the causative agent being the opponent's foot (25 per cent), the head (18 per cent), the knee (16 per cent), and the arm (12 per cent). At a recent postgraduate conference, four outstanding college trainers seriously doubted the efficacy of present-day facial protection bars in reducing the incidence of facial injury; in fact, they felt that they might be responsible for a number of cervical sprains of the twisting type when grasped by an opponent, which frequently happens in spite of the 15-yard penalty rule.—*Donald B. Slocum, The Mechanics of Common Football Injuries. J.A.M.A. 170:1640 Aug. 1, 1959.*

Radiation therapy in the management of oral cancer

■ *David J. Lochman,* M.D., Chicago*

In terms of the number of years that radiation therapy has been used in the treatment of cancer, it must be considered a relatively new therapeutic method. The author states that cancers are cured, but the cure rate is highest in those areas that are easily examined and give early symptoms. With decreased salivary gland function, apparent increase in caries rate, and the dangers involved with removal of teeth in the post-irradiation state, the author indicates that prior to radiation therapy of oral cancer, patients, with few exceptions, should be prepared by having all teeth, roots and impactions removed. Besides the older roentgen ray units, there is included in the radio-therapists' armamentarium, radium implants, radioactive isotopes, supervoltage and electron beam therapy.

With a tradition of barely 50 years, radiation therapy can still be looked on as a relative newcomer in the field of cancer therapy. This is particularly so as each decade has seen some evolution in technical facilities, with associated advance in theoretical knowledge of radiobiology. This requires a reorientation of thinking regarding applications and limitations of various forms of radiation in their use for the palliation or cure of cancer. The two big changes that have come to the fore in clinical radiotherapy in the last decade are the widespread availability of supervoltage and the introduction of the electron beam for deep therapy. It is of special interest to the dental profession that both of these new agents have features of considerable interest and importance in regard to management of cancers of the head and neck region. This is not, however, to say that the older roentgen rays and radium do not still retain areas of preferred use.

A vast amount of professional and lay enthusiasm is directed to the search for what truly will be miraculous agents for the solution of the cancer problem—the problem of cure of disseminated malignancies. This search is of first importance. But while eyes are fixed on the zenith, achievements that are possible with technics already at hand in radiation and surgery must not be forgotten. The pessimism which so often leads to delay in diagnosis and nihilism in treatment of cancer patients is unjustified and intolerable.

Cancers are cured every day—a host of them. It is interesting that the majority

are cured by radiation. Why, then, is there still a cancer problem? Because the carcinomas which are fairly consistently cured are those confined to the skin, the lip, the uterus, and, to an appreciable degree, cancers of the mouth and upper airways. These cancers are located where they can give early symptoms and are readily accessible to examination. Dentists have a key role in the diagnosis of oral and paraoral malignancy. No other group has comparable access to the mouths of so many humans for the purposes of examination and diagnosis.

It was stated that radiation therapy was of special interest in the treatment of cancer of the oral cavity and adjacent structures. This is so because radiation is the only method so far known whereby cancer can be cured without destructive interference with normal structures and normal functions. As the functions of the oral cavity are indispensable to life and its enjoyment in a society, this is a relatively significant advantage.

■ *Oral Preparation for Radiation Therapy*

Radiation causes a temporary suppression of salivary gland activity lasting for a variable length of time, depending on the dose. With the high doses needed for treatment of epidermoid tumors, the dryness may continue for 9 to 12 months, and full normal flow never quite returns. There is a permanent alteration in the chemistry and physical characteristics of the saliva. It is presumed that the great acceleration of dental decay is dependent on these changes since all of the teeth, whether exposed to the beam of radiation or not, are involved. Although helpful, meticulous care will not prevent these caries. Likewise, patients born and raised in areas where the drinking water contains natural fluorides are not immune to this decay.

To complicate matters further, radiated bone is prone to poor healing and bacterial invasion. This is true even when the treatment is with supervoltage, radiation of which is much less heavily absorbed by the bone. Therefore, extraction of teeth from radiated bone is dangerous. A chronic, intractable osteomyelitis of this devitalized bone may ensue. Certain principles are laid down to minimize the risk: Infiltration of the adjacent tissues with local anesthetic should be avoided, general anesthesia being preferable. The patient should be maintained on antibiotics until healing is complete. Good hemostasis must be obtained and the soft tissues should be carefully sutured to obtain full primary closure over the exposed bone. But despite these precautions the risk of ultimate osteomyelitis with sequestration and a chronic draining sinus is high. The only hope, then, of cure is the extensive and disfiguring surgical resection of all radiated bone.

It is far better to anticipate these difficulties by removing the teeth before the radiation is begun. Because of the usual anatomic relationships of tumors of the mouth and upper airways and their routes of metastases, the radiation is likely to be maximum in the posterior half of the mouth and involve the maxilla and the mandible. This then requires the removal of all molars and bicuspids. Retained roots and impacted teeth must not be overlooked. The front teeth should also be removed unless in excellent con-

dition, a concession which is made only to the younger patients. As most cancer patients are in the older age groups, all the teeth generally must be removed.

These patients should not be looked on as cases for routine extraction procedures. First, speed is important since avoidable delay might cost the patient his life. Second, it must be remembered that the patient has just been told, by implication if not directly, that he has cancer. As though this were not enough, he is also told that all his teeth must be extracted. He should have close supervision for his morale as much as for his safety. The patient should be hospitalized for the extractions. Treatment usually can start after ten days unless there has been some complication to delay the healing.

■ *Radiation Treatment of Malignant Lesions*

The normal tissues of the body act as barriers to the accessibility of the radiation to the lesion to be treated. This is especially true of the older roentgen rays. Where the cancer is located on the skin or the lip, accessibility is no problem. Essentially certain success in the cure of such lesions is the result. When the cancer is more deeply located, the problem is more difficult. Radium can be carried into the oral cavity as a needle implant. This is a dependable treatment for carcinoma of the mandible third of the tongue. Moulds can be arranged carrying radium for treatment of surface lesions of the gingival margins and buccal mucosa with good results. Certain of the radioactive isotopes—cobalt, iridium and tantalum—can be used in a similar manner to radium with special advantage in selected instances. However, when deeper and less accessible tissues have been invaded, it is necessary to turn again to radiation from outside the patient's body.

Table • Five year results of radiotherapy for cancer—head

Area	No. patients	Survival
Skin	1,609	99%
Lip	867	97%
Tongue	21	38%
Buccal mucosa	14	41%
Alveolus	20	34%
Palate	11	83%
Floor mouth	26	64%
Tonsil	18	21%
Pharynx	18	13%
Paranasal sinus	24	29%

If only roentgenotherapy is available, treatment is limited to palliation unless the tumor is of a radiosensitive type such as lymphosarcoma, lymphoepithelioma, or certain undifferentiated epidermoid tumors. An exception is made in some instances when the tumor is so situated that the ingenious use of multiple beams of radiation will permit the achievement of a potentially curative dosage within the patient's tolerance.

But despite these limitations, results could be obtained with the older methods. One of the more recently published surveys of results of cancer therapy is that of the Saskatoon Cancer Clinics covering the 1942 to 1952 decade.[1] Those results, as expressed in five year survival, corrected for normal life expectancy, are shown in the table. The figures are fairly typical of what could be expected from good radiation therapy in the decade just prior to the wide scale introduction of supervoltage.

In the past decade supervoltage has become generally available in large cen-

ters and major hospitals. It is best known in its most common and practical form as telecobalt therapy. This same decade has seen the appearance of electron beam therapy. This is a beam of electrons with sufficient penetrating power to be used directly for treatment of cancer patients. These two advances promise to reduce some of the difficulties of accessibility. Supervoltage radiation is more penetrating radiation than the older roentgen rays and can reach deep-lying tissues with more adequate dosage. In addition, the intervening normal tissues are spared many of the damaging effects of heavy roentgen-ray radiation. The skin shares in the reaction only slightly, and the patient is not subjected to the discomfort of a radiation dermatitis. The lower dose received by bone is of considerable significance for treatment in the head and face regions where tissues are surrounded by dense bony structures. It should not be inferred, however, that dental preparation of the mouth is not just as important as when roentgen rays are used.

The patient being treated with telecobalt or other supervoltage is still subject to one considerable discomfort. The tumor-killing effect of radiation depends on producing in the tumor and adjacent tissues a considerable alteration in tissue physiology, and this is manifest on the mucous membrane as a characteristic mucositis. First there is a reddening, and this is followed, as the dose becomes higher, by the appearance of a whitish membrane which becomes confluent. This mucositis is uncomfortable and may interfere with the nutrition of the patient. With roentgen rays or with supervoltage both sides of the mouth or pharynx are involved since the radiation does not stop after reaching the tumor tissue but continues onward and out the other side of the body.

The electron beam is different. It is very effective in bringing the adequate dosage into the patient and to the tumor site. Then it stops rather abruptly beyond the depth of the tumor. This then saves the deeper tissues completely from radiation effect, limiting the mucous membrane reaction to the tumor side of the mouth. The patient is spared much discomfort and problems of maintaining adequate nutrition do not often arise.

■ *Comment*

Sufficient time has not yet passed to permit full evaluation of these newer forms of radiation in effecting cure of oral and paraoral cancer. They have not rendered older forms of radiation therapy obsolete, nor are they competitive with each other. Each has advantages in treating some lesions and limitations in treating others. It does appear, however, that with the addition of these newer radiation tools there will be further increase in the salvage of cancer victims. Even if the increase in long term survival proves to be very modest, much more is achieved in the way of palliation because of the greater comfort of the patient undergoing treatment. The reactions and systemic discomfort associated in the past with a major course of radiation have to an appreciable extent been done away with, and symptomatic relief is more easily achieved.

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1. Watson, T. A. Results of treatment of cancer in Saskatchewan. Regina, Sask., Ministry of Public Health of Saskatchewan, 1958.

Painful (burning) tongue of foliate papilla (lymphoid follicle)

■ *Joseph Schroff,* M.D., D.D.S., New York*

When a patient is seen for diagnosis of a painful tongue, it is essential to examine the foliate papillae (lymphoid follicle) on the posterior lateral surface of the tongue for evidence of inflammation, hypersensitivity or more serious change. Local mechanical irritation by the teeth is a common cause. Excision of the papillae may be necessary to obtain complete relief. Routine microscopic study of the excised tissue is indicated since a malignant growth may also occur in this region.

While lecturing recently on the subject of pain in the mouth to the senior dental students at Columbia University, I made reference to the foliate papilla (lymphoid follicle) region of the tongue. Several days later, the students mentioned they could find no references to the foliate papilla (lymphoid follicle) in their text books. Checking and reviewing the dental and medical literature, I found practically nothing in the current periodicals pertaining to this portion of the tongue. Because of the lack of published data and the importance to the subject of pain in the tongue, some of my observations will be reported.

Pain is one of the common yet most difficult problems which confront the dentist or physician. When the pain is located in the tongue, the symptoms have special meaning for the patient because of the fear of cancer. Most patients first seek the help of a dentist in the event of pain anywhere in the mouth. The causes of tongue pain may be systemic or local, often both.[1] The local factors usually are related to dental structures that irritate some part of the tongue but especially that of the foliate papilla (lymphoid follicle) region.

The foliate papillae are situated at the posterior part of the lateral border of the tongue, just anterior to its lateral attachment to the glossopalatine arches (Fig. 1).

Pain in this region frequently creates the fear of cancer in the patients. These patients usually mention having frequently examined their tongue in the mirror, at which time they project the tongue far forward in the process of the examination and the sight of the circumvallate papillae or distended veins of the dorsum of the tongue usually is mistaken by them to be a sign of malignancy. However, the real site of the pain is situated

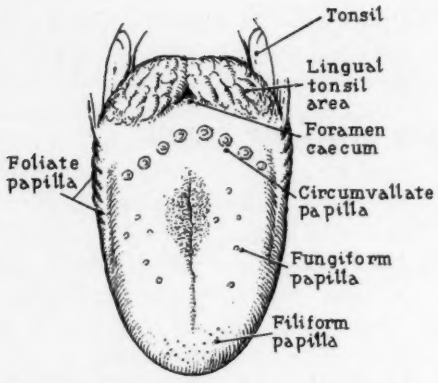

Fig. 1—Schematic presentation of dorsum and lateral borders of tongue

at the lateral border of the tongue and is not seen in their examination. Unfortunately, this site is also frequently overlooked by the dentist and physician in the examination of the patient's mouth.

The foliate papilla (lymphoid follicle) region can be irritated by sharp cusps of lower molars that are inclined lingually, thus crowding the tongue, by jagged edges of carious teeth, rough filling material, gold clasps, gold shell crowns, or lingual cusps of upper bicuspids or molars that protrude downward. Artificial teeth on lingual saddles or sharp cusps of teeth on complete dentures also may irritate this region (Fig. 2-4).

■ *Anatomy of the Tongue*

The tongue has the shape of a reversed old fashioned buttoned shoe. It is formed from two anlage, one forming the posterior part (root or pharyngeal) and one forming the anterior part (oral). It is with the dorsum and the lateral borders of the tongue covered by squamous epithelium that this paper is chiefly concerned.

In man, the tongue immediately anterior to the terminal sulcus contains three main and one secondary type of papillae, (1) circumvallate papillae, about 10 to 12 in number, arranged in an inverted line with the large papilla in the midline and decreasing in size toward the sides, (2) numerous filiform papillae which cover the entire dorsal surface in front of the vallate papillae and give the tongue its velvety appearance, (3) fungiform papillae, smaller and mushroomlike, singly and irregularly distributed between the filiform papillae, but not quite so high as the filiform (Fig. 1). Early in the development of the tongue, (4) the foliate papillae are also present. The foliate papillae, in man, generally are vestigial and insignificant, and usually are seen as a few vertical parallel folds situated at the lateral border of the tongue (Fig. 2) just anterior to the glossopharyngeal fold attachment.

Variants of the early foliate papillae are still seen in animals. Thus, in the anthropoid apes, they appear as large soft folds with pointed apexes, whereas in the rabbit or hare, they are more highly developed and appear as leaflike folds. Occasionally, these early forms are found in humans. These leaflike folds, when present, are matted together covering the slits and protect the tongue from irritation.

Microscopic examination of the foliate papillae region usually shows that they contain a single lymphoid follicle but occasionally two lymphoid follicles are seen. Special nerve tissue stains show fascicles of sensory nerve fibers in the field (Fig. 5,6).

The root (pharyngeal) portion of the tongue lies behind the terminal sulcus. It

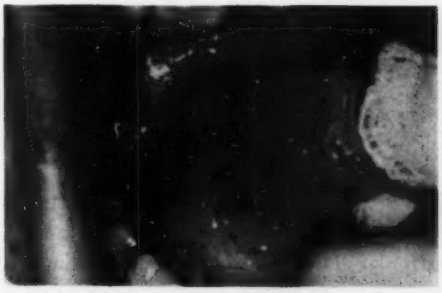

Fig. 2—Foliate papilla region, right side, inflamed. Note adult type papilla. Lower teeth inclined lingually and cusp distinct and sharp; also upper molar lingual cusps below occlusal plane

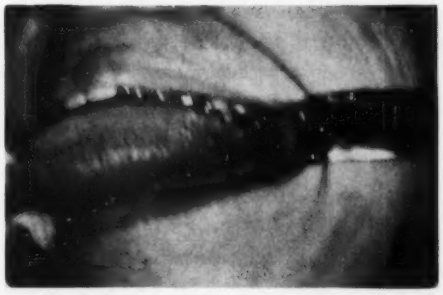

Fig. 3—Foliate papilla, left side, traumatized and slit in ridge inflamed and distinct. Note buccal distal cusp of upper first molar and third molar below occlusal plane

Fig. 4—Foliate papilla region, right side, inflamed. Note lingual cusp of upper first bicuspid and first molar below occlusal plane acting as traumatic agents

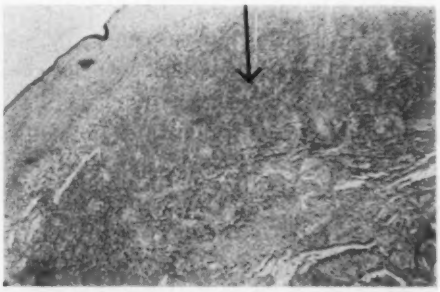

Fig. 5—Low power view shows lymphoid tissue with single follicle

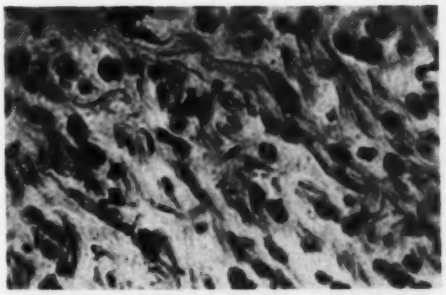

Fig. 6—Special nerve stain which shows region to be richly supplied with nerve fibers. High power view

Fig. 7—Patient with "lump in throat." Hypertrophy of lingual tonsil region of tongue

is free of taste buds but contains widespread lymphoid tissue separated by connective tissue, called lingual follicles. The lingual follicles number from 30 to 100 and appear as semi-spherical prominences with small crypts of ducts of mucous gland which the follicles enclose. This entire region of lingual follicles is called the "lingual tonsil" (Fig. 1). This area may become the seat of inflammation, hypertrophy, follicular abscess, or tumor formation (Fig. 7). Pain is not usually associated with this region unless infection occurs.

The lingual tonsil region forms the anterior part of the special lymphadenoid tissue that together with the faucial tonsils on each side and the adenoid tissue on the posterior wall of the pharynx is called "Waldeyer's tonsillar ring." Around the lymphadenomatous masses, the lymphatics commence and pass to the lymph glands under the jaw and in the neck.

Lymphatic vessels which originate in the upper and lower lips, the tip and the anterior free portion of the tongue, corresponding mucous membrane of the floor of the mouth and gums terminate in the submental lymph nodes. Lymphatic vessels originating in the surface of the midportion of the tongue and corresponding mucous membrane of the cheek, gum and floor of the mouth drain into the submaxillary lymphatic glands. The deep cervical lymphatic glands drain the base and posterior portion of the tongue and the mucous membrane of the palatal fold and soft palate.

Numerous taste buds and mucous glands are found on the side of the circumvallate and fungiform papillae on the dorsum and sides of the tongue.

The tongue is innervated by the (1) glossopharyngeal nerve, (2) hypoglossal nerve, (3) lingual nerve and (4) a few twigs from the internal laryngeal nerve. The glossopharyngeal nerve is the nerve of taste and common sensibility. The sensory fibers are distributed to the taste buds of the posterior third of the tongue and the adjacent mucosa in the region of the oral pharynx and the tonsil. It gives off twigs to the foliate and circumvallate regions.

The lingual branch of the mandibular nerve, part of the sensory fibers of the facial nerve and chorda tympani supply taste fibers to the anterior two thirds of the tongue.

The hypoglossal is the motor nerve. It innervates the intrinsic and extrinsic muscles of the tongue. The lingual nerve also anastomoses with the hypoglossal as a motor nerve.

Most patients give a history of having consulted both dentists and physicians. The pain is localized in the same spot in the tongue, and the condition starts as a burning sensation which later becomes very painful and may be accompanied by some disturbance in swallowing. Some

Fig. 8—Squamous cell epithelioma in leukoplakia in foliate papilla region

Fig. 9—"Lump on side of tongue." Note lingual cusp of upper second molar

say the symptoms come on toward the end of the day and are localized in one spot (the foliate papilla region). This pain differs from that of neuralgia (of the trigeminal or the glossopharyngeal nerves) which is characterized by paroxysms of brief lancinating burning pains.

Examination of the tongue discloses that the foliate papillae (lymphoid follicle) region is inflamed. Touching this region with a probe sometimes elicits a sharp lingering pain that may radiate to the tonsil region and downward into the neck.

To obtain the best visualization of the foliate papillae region, the cheek should be retracted. The tip of the tongue is then grasped with gauze, pulled forward and deflected laterally to the opposite side of the mouth (Fig. 2-4, 8, 9). The parallel vertical folds on the lateral border of the tongue will be brought into view and seen as slits, often with different degrees of irritation (Fig. 2-4).

The region should be palpated gently for induration. At the same time, the teeth of the upper and lower jaw on that side should be checked for rough spots. Partial or complete dentures should be critically examined as traumatic agents and as possible sources of irritation to the region.

■ *Report of Cases*

The following three case histories illustrate the two extremes of pain.

CASE 1—A woman, aged 71, had as chief complaint a sore right side of the tongue of 18 months' duration. The pain had followed the replacement by her dentist of a tooth on the lower right fixed bridge. She also complained of a burning sensation which remained in one spot all the time. Physical examination of the mouth revealed inflammation in the right foliate papilla region of the tongue, and when the region was touched with a metal probe, the patient said, "That's the spot." There was a fixed bridge which extended from the first bicuspid to the second molar area and crowded the tongue. The capped upper second molar protruded downward touching the foliate region when the mouth was closed.

Treatment consisted of grinding and polishing the lingual surface of the fixed bridge and the occlusal surface of the

upper second molar. This gave the patient some relief for a few days. Subsequently, when the pain returned, an injection of procaine into the foliate papilla region produced some relief for about a week. The patient was advised to see her dentist regarding the fixed bridge and was assured that her condition was not serious (cancer). She refused to return to her dentist but preferred to try occasional procaine injections into the region to give temporary relief. When finally I insisted that she return to her dentist or submit to the excision of the region, she consulted another dentist who ten days later reported his procedure to me. He had placed a splint over the upper molar and one over the bridge, preventing contact of the teeth with the tongue. This relieved all symptoms. Eliminating the upper jaw as a factor, he then replaced the lower bridge which gave the tongue more room. She has since been free of symptoms.

CASE 2—A woman, aged 50, complained that for three weeks she had had intense pain on swallowing. The pain was localized on the left side, "beyond the gum of the last molar tooth area." The patient refused to eat because of the pain; she also had cancerphobia. Physical examination revealed the patient to be edentulous. There was inflammation of the left foliate papilla region. When touching the region with a metal probe, pain was elicited. A few drops of procaine injected into the region relieved the pain and the patient was able to drink some water easily.

Examination of her dentures with the finger tips revealed sharp lingual cusps on the teeth. The sharp cusps were ground down and polished and the patient was sent home, assured that her condition was not serious. She was free of pain for a few days but it returned. Injecting the foliate papilla region with procaine to which a few drops of absolute alcohol was added, the pain was controlled for a few weeks. The patient was then informed that the excision of the region would give her permanent relief. After consultation with her physician, the region was excised.

OPERATION — Local anesthesia was used. Lidocaine was injected in the left mandibular region plus local infiltration in the papilla region. The inflamed region was grasped with an Alyce clamp and the tissue excised. The edges of the wound were sutured. There was local soreness for a few days, but the patient was beginning gradually to swallow liquids without pain. In two weeks, the wound was entirely healed. She was now able to eat and swallow all foods and has since been free from pain.

MICROSCOPIC EXAMINATION — The report of the microscopic examination was as follows: "Sections reveal fragments of tissue covered by a surface striatified squamous epithelium which is intact and shows no epithelial irregularities. This epithelium lines deep crypts which extend into the underlying tissue, and there is some keratinization. The tissue immediately beneath the covering epithelium contains a lymphoid follicle with germinal center formation. Deep to these, collections of mucous and serous glands are present, as well as numerous bundles of striated muscle. The connective tissue immediately surrounding the lymphoid fol-

licle is infiltrated by lymphocytes and plasma cells and is hyperemic. In the depths of the crypts, collections of polymorphonuclear leukocytes are present. Special stains show large amounts of nerve fibers within the field of examination. There are no signs of malignancy. The diagnosis: tongue, fragment of foliate papilla, inflamed." When the patient was shown the report, she then stated that her mother had died of cancer.

CASE 3—A woman, aged 47, complained that her tongue was sore on the left side. The tongue was enlarged and had felt strange in her mouth ever since the replacement of a fixed bridge in the lower left side of the mandible in August 1957. Twenty-four hours after insertion of the bridge, the tongue had begun to feel enlarged with progressive soreness. The patient had reported back to her dentist and described the symptoms. On examination of the tongue and mouth, her dentist told her that the tongue appeared to be normal and he found no reason for the patient's complaints.

The discomfort persisted; the tip of the tongue began to burn, and the left side of the tongue became irritated and sore. The patient was frequently awakened at night by a sensation of burning and swelling of the tongue. She had to resort to sucking on ice in order to get some relief. The tongue was constantly sore and enlarged and became worse toward the end of the day.

In November 1957, the patient came to see me at the Medical Center. Physical examination of the mouth revealed the left foliate papilla region of the tongue to be enlarged, red and irritated. There was a fixed bridge composed of one cap, a two space splint and one cap which spanned the lower left molar region which was crowding the tongue. I filed down the lingual aspect of the bridge a little and referred her back to her dentist. I telephoned him and suggested that he relieve the bridge so as to allow more room for the tongue. The dentist filed the bridge down but insisted the mouth and tongue were normal. He prescribed a tranquilizer and his diagnosis was "phobia." The patient, however, had no relief from her symptoms and the glands in her neck became enlarged. I was not consulted further.

In December 1957, the patient visited a dentist in her neighborhood because she could not get to her own dentist. This dentist noted the irritation of the tongue and filed the bridge down a little more. A few weeks later she returned to her own dentist because the tongue showed no improvement and the glands in her neck were still enlarged. She now had pain and difficulty when she turned her head. Her dentist insisted the tongue was normal and prescribed phenobarbital. He thought the patient exaggerated and imagined the symptoms. She continued her visits from December 1957 to October 1958.

In October 1958, the patient went to another dentist because of a small cavity in a tooth in the left side of the mandible. This dentist noted the over-sized bridge, the enlarged tongue and irritated papilla. He filled the cavity of the tooth and then proceeded to work on the bridge. He created interproximal spaces in the bridge which relieved the tongue and molded the cutting edges of the teeth (they had

previously been flat) and made them functional.

After three visits the tongue, mouth and neck were symptom-free and the patient is still happy as of December 1959.

■ *Microscopic Examinations*

The following are reports of microscopic examinations of papillae of the tongue in other patients.

A woman was seen November 17, 1954, with the chief complaint of severe pain of tongue, with inflammation in the foliate papilla region. The report of microscopic examination was as follows:

"Sections of tongue show hypertrophy of the mucous membrane with parakeratosis and acanthosis of the surface epithelium. The lamina propria is edematous, richly vascularized, and hyperemic, containing a localized nodular aggregate of lymphoid tissue with prominent germinal center. Deep to the lamina propria, there is an intermingling of striated muscle, adipose tissue and accessory salivary gland tissue. There is a mild interstitial fibrosis of the striated muscle. The diagnosis is hypertrophy of the foliate papilla, neuromatosis of tongue."

The pathologist reported one week later that special nerve tissue stain showed the area to be "crawling with nerve fibers" (Fig. 6).

Another woman was seen May 18, 1953, with the chief complaint of pain of the tongue in the foliate papilla region. This region was inflamed. The report of microscopic examination was as follows:

"Section reveals a fragment of somewhat distorted tissue containing numerous mucous glands and showing skeletal muscle on its deep surface. One face presents squamous epithelium immediately beneath which appears a circumscribed mass of lymphoid tissue containing a single poorly defined follicle. The epithelium appears to form a depression or crypt about this lymphoid tissue. There is no evidence of malignancy. The diagnosis is foliate papilla area (lymphoid follicle)."

A woman was seen August 28, 1953. She complained of a lesion on her tongue in the foliate papilla region. The microscopic examination was reported as follows:

"Sections from the tongue reveal no change within the squamous epithelial lining of the mucosa. In the substantia propria of the mucosa is a circumscribed area of lymphoid tissue which is penetrated by epithelial crypts in continuity with the squamous epithelial lining of the mucosa. This lymphoid tissue is follicular with formation of average-sized germinal centers which show no degree of phagocytosis and only a slight degree of mitotic activity. No changes are present within the adjacent mixed glands of the tongue or within the muscular tissue of the tongue. Irregular hemorrhages are present. Special nerve tissue stains reveal only a few neurones extending into the region of the lymphoid tissue. The diagnosis is foliate papilla inflammation."

The foregoing reports of microscopic examinations of the foliate papilla region reveal that there is usually a single circumscribed mass of lymphoid tissue containing a single defined follicle (Fig. 5).

At the beginning of my investigation, the pathologist would diagnose the tissue as "lingual tonsil," but after discussing the location of the tissue excised, he agreed with me that he would call it the

foliate papilla (lymphoid follicle) and not the lingual tonsil.

During the next few months, I had the opportunity to examine two women patients, each of them complaining of a "lump in the throat" with frequent coughing spells. Their conditions were diagnosed as "lingual tonsils."

One of them was seen October 31, 1952. She complained of a "lump in the throat." There was hypertrophy of the lingual tonsil region of the tongue (Fig. 7). The patient refused to have it removed.

The other woman was seen in October 1953. Her chief complaint was of a "lump in the throat," with a frequent dry cough but no pain. The clinical diagnosis was lingual tonsil. The tissue from the lingual tonsil region at the base of the tongue was removed with an adenotome. The report of the microscopic examination was as follows: "Examination of tissue removed reveals striatified squamous epithelium on the surface and there are multiple lymph nodes underneath showing the usual follicular pattern. The adjoining stroma is edematous and congested and shows an occasional glandular structure (Fig. 10)."

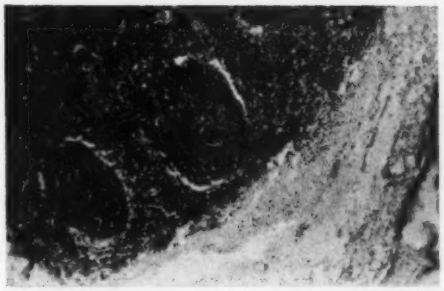

Fig. 10—Low power view showing numerous lymphoid follicles in field. Tissue removed from base of tongue (lingual tonsil)

■ *Treatment*

The principles involved in the treatment of pain in the foliate papilla region are fundamental. Sharp cusps in natural teeth that can irritate should be rounded off and polished. The lingual cusps on all artificial teeth and dentures should be turned away from the tongue and polished smooth. All inlays or amalgam fillings, clasps, and so on should be constructed so that they do not cause trauma in this region. Cusps of upper molars that protrude downward below the occlusal plane and can traumatize this region should be eliminated.

After all local irritants from the dental standpoint are ruled out, occasionally cauterization of the region with chromic acid (10 per cent), silver nitrate (10 per cent), or the use of the surgical diathermic needle to coagulate the region will relieve the condition at least temporarily.

The patient should be placed under observation and not dismissed lightly without warning of possible danger, thus instilling the importance of regular periodic examinations.

If the foliate papilla (lymphoid follicle) region is indurated or is suspect, the tissue should be excised and examined microscopically for malignancy. No part of the tongue is exempt from cancer. Chronic irritation and injury caused by teeth are considered as possible factors. However, in four patients, I have excised the foliate papilla region and found squamous cell epitheliomas. Statistics indicate that precancerous conditions seem to

be more common in the forepart and at the border of the tongue than behind the circumvallate papillae.

One patient, a man aged 45, was seen October 26, 1939. This patient's history is interesting and instructive. He gave a history of complaining of tongue irritation for one year. He said that he had consulted numerous dentists and physicians but was told they could see nothing wrong. Six months previously, he had visited the clinic in one of the well known cancer hospitals where again nothing was seen and he was instructed to report back if he had any further trouble. The patient did not return to the clinic but consulted a dentist instead who removed the gold crowned lower third molar and then referred him to me for treatment of the tongue condition.

Examination of the tongue revealed a raised 12 by 10 mm. reddish soft mass of tissue in the foliate papilla region. The base was indurated. The clinical diagnosis was squamous cell epithelioma of the tongue. A biopsy was performed. The microscopic examination was reported as follows:

"Sections show some of the mucous membrane and submucosa of the tongue. In one section, the mucous membrane is ulcerated and the submucosa and the intrinsic muscle of the tongue are invaded by a tumor composed of cords of relatively undifferentiated squamous epithelial cells. They are hyperchromatic, show mitosis on an average of two or three in every high power field, and show no intercellular bridges or keratinization. This is a relatively poorly differentiated tumor which is of a high degree of malignancy and should be radiosensitive. The diagnosis is squamous cell epithelioma of tongue."

The patient was referred to a cancer hospital for radiation therapy. He died the following year.

A woman, aged 60, was seen October 24, 1942. She was suffering from squamous cell epithelioma and leukoplakia in the foliate papilla region. This patient was referred to me by her physician for the biopsy of the "mass" on the tongue. The mass was excised and the base cauterized with the surgical diathermic needle. Her physician (radiotherapist) implanted radium needles into the region and then followed with radiation therapy to the neck (Fig. 8). The report of the microscopic examination was as follows: "At the border of the specimen the epithelium is very thick and shows marked keratinization and long coarse rete pegs. The subepithelial tissue is moderately infiltrated by lymphocytes. This portion of the picture is typical leukoplakia. The epithelium of the remainder of the specimen is much more irregular. The downward prolongation extends to the muscle layer, but does not infiltrate it. The basement membranes of these prolongations are quite indistinct and a number of islands have lost continuity with the surface. The epithelial cells vary greatly in size and shape but mitosis is relatively rare. There is well marked keratinization and some pearl formation. This is well differentiated and superficial. Squamous cell epithelial development in presence of leukoplakia (Fig. 8). The diagnosis is squamous cell epithelioma of tongue. Leukoplakia."

This patient was alive 15 years later. She was seen recently at the Delafield

Cancer Hospital for a stomach ailment. The tongue region had healed completely.

A man, aged 56, was seen October 16, 1947. He was referred because of a "lump on the side of the tongue." He stated that this was of three months' duration, but his story was questionable. The mass was excised and examined. The patient was referred to a radiotherapist for treatment. He died two years later (Fig. 9).

The report of microscopic examination was as follows:

"The section shows a moderately differentiated squamous cell epithelioma involving a well defined area of the mucous membrane and the submucosa. Its penetration is deep for it reaches the muscle. The tumor grows in cords supported by thin cord tissue stalks. Mitoses are frequent. The submucosa and muscle layers contain a moderate amount of lymphocytes and plasma cells and the adjacent tissue is quite vascular. Diagnosis is squamous cell epithelioma of tongue."

■ *Summary*

At the New York Dental Centennial Meeting on December 3, 1934, I was a participant in a symposium on "the burning tongue." In the paper delivered at that time,[1] I made reference to the systemic and local causes of burning tongue, citing several case histories but emphasizing one type of local cause that had psychological implications; that is, mechanical irritation of the lymphoid follicle region of the tongue. I stressed pain mechanically produced by local dental factors in the specific region called the lymphoid follicle region of the tongue.

The foliate papillae (lymphoid follicle) are situated at the posterior part of the lateral border of the tongue, anterior to the lateral attachment to the glossopalatine arches. This is a lymphoid follicle with sensory nerve fibers and not a lingual tonsil. To bring this region into view for examination, the cheek is retracted, the tip of the tongue grasped with gauze and deflected to the opposite side of the mouth.

The foliate papilla region is often irritated because of local mechanical factors; that is, sharp cusps of upper and lower natural teeth, jagged edges of carious teeth, artificial teeth on lingual saddles, complete dentures, and so on. These factors produce pain and burning in the tongue.

These observations indicate that the foliate papilla region should be considered when patients complain of pain in the tongue. The dental profession has the moral responsibility of preventing and eliminating all possible dental mechanical irritations to the foliate papillae region.—*120 West Eighty-sixth Street.*

*Emeritus William Carr professor of oral surgery, School of Dental and Oral Surgery of the Faculty of Medicine, Columbia University.

1. Schroff, J. Burning tongue. Rev. Gastroenterol. 2:347 Dec. 1935.

■ A Profession

A profession is an occupation requiring preliminary intellectual training, pursued primarily for others and not merely oneself, and accepting as the measure of achievement one's contribution to society rather than individual financial reward.—*Justice Louis D. Brandeis.*

Early management of maxillofacial mass casualties

■ *Charles C. Alling,* D.D.S., M.S., Indianapolis*

In the event of generalized thermonuclear warfare, the incidence of mass casualties encountered would be staggering. Prompt sorting and emergency treatment by medical and dental personnel would be the first step in recovery from such a disaster. Establishment of a patent airway, control of excess hemorrhage and the support of bony fragments are the complications of maxillofacial injuries that the dentist may be called on to treat. A system of patient evacuation and facilities for definitive treatment are outlined. The dentist is advised how he can best fit into the disaster plans of his community.

The blinding white brilliance that would herald the beginning of thermonuclear warfare could deposit a debris of more than 30,000,000 living civilian casualties in the United States.[1] A day or so later only about half of these casualties would still be alive, and they would be in dire need of care. The main source of assistance, civilian physicians and dentists, would emerge from ranks depleted by deaths and injuries from the blasts, but thinned out in a greater ratio than the general population because of the concentration of professional personnel in target areas. To these surviving physicians and dentists would fall the task of preserving our most vital resource as a nation: our manpower. In this situation treatment would be limited to that which would provide the bare essentials for survival and would be directed toward returning the greatest number to their duties.

In the spirit that periodic review and continuing education are necessary for the professional man, this paper will discuss the role that dentists may have in the management of oral and facial injuries in the event of a massive number of maxillofacial casualties as may occur in thermonuclear warfare.

Battlefield injuries and accidents involving high-speed land and air transportation have contributed to the complex trauma patterns encountered in the past four decades. Keeping pace with this increased severity of facial injuries have been advances in surgical technics, evacuation of patients, therapeutics, anesthesia and the establishment of oral surgery resident training programs in the civilian and military hospitals.[2-6] The prospect of mass population disasters should not cause the abandonment of the principles of treatment and evacuation, but instead should cause the application of these principles to the peculiar problems that will be brought about by mass casualties.

■ *Emergency Treatment*

As a general principle, maxillofacial injuries are not acute surgical emergencies except when they produce asphyxia or exsanguinating hemorrhage. Prompt and effective attention must be directed to the correction of these two conditions.

Experiences and writings emerging from the two world wars and the Korean conflict emphasize the basic necessity of guarding against respiratory obstructions.[7-10] Occlusion of the airway may be caused by blood clots, foreign bodies such as avulsed teeth, torn bits of soft tissue, bony fragments, dental prostheses, and extraneous matter that may have been blasted or forced into the oral or nasal cavities. Blockage of the pharyngeal airspace may be caused by the tongue falling back because of fractures of the anterior mandible or lacerations at the base of the tongue which would prevent control of the protruding action of the genioglossus muscle.[11]

If respiratory obstruction is obvious or impending, the tongue should be grasped and pulled forward and the pharynx cleared of foreign bodies with fingers, pickup instruments, and suction. To prevent future respiratory obstructions the following procedures may be carried out:

1. A properly placed oral or nasal airway may be utilized.

2. The patient may be placed in a prone or side position with his face pointing downward or to the side so that gravity will prevent mucus, blood and foreign objects from pooling in the pharynx.

3. A device such as a safety pin, towel clip, or a ligature may be passed through the body of the tongue and either attached to the patient's clothing or held by an attendant.

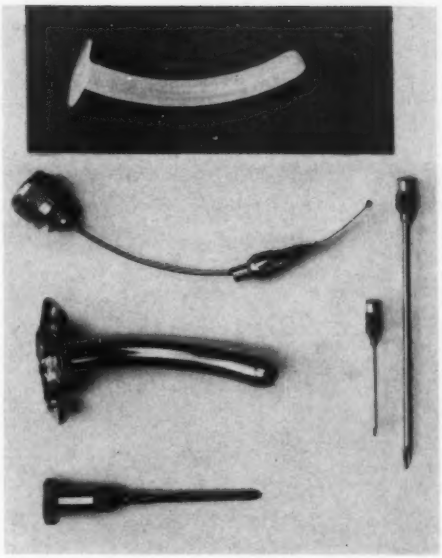

Fig. 1—Component parts of Shelden-type tracheotome at left and on the right, 13 gauge needle with 21 gauge injection needle beside it for comparison

The necessity for tracheotomy must be weighed in practically every patient with a maxillofacial injury. It is of interest to recall Chipps'[8] observations of the liberal use of tracheotomies in 1,000 osseous maxillofacial injuries incurred during the Korean conflict where there were no deaths due to asphyxiation even though there was frequent use of air evacuation, often in helicopters with no one attending the patients. This serves to emphasize the contention that tracheotomy rarely should be an emergency procedure, but it should be a preventive measure. If there is any question as to the need for a tracheotomy, it should be performed. An airway directly from the

Fig. 2—Patient with fractures of the mandible and middle third of the face, received at William Beaumont Army Hospital, El Paso, Texas, after evacuation by air. Head bandage effectively immobilized fractures during transit

trachea may be provided on an emergency basis by the insertion of one to several 13 gauge needles in the upper tracheal apparatus.[12] Shelden and his colleagues[13] made a signal contribution to rapid tracheotomy in a few simple movements by developing a tracheotome (Fig. 1).

Hemorrhage is usually not a pressing danger in maxillofacial injuries except as it affects the airway. Pressure dressings, closure of lacerations, and immobilization of facial bone fractures will correct most hemorrhage problems in the oral and facial regions. Hemorrhage of the internal maxillary artery may be profuse and, because of its position in the infratemporal fossa, inaccessible to corrective procedures; ligation of the external carotid artery may become necessary and should be performed rather than blindly and futilely searching for the internal maxillary artery. The same approach could apply to hemorrhage in the distribution of the lingual artery; ligation of the lingual artery at Lesser's hypoglossal triangle will give positive control of the more peripheral vascular lacerations.[14] However, in most instances of mass casualties, persons in need of a dissection and ligation to control a hemorrhage will be dead by the time effective treatment will be available.

■ *Disposition of Patients*

In the event of mass casualty, treatment facilities will be clogged with casualties in need of actual lifesaving procedures and those who have passed beyond human help. Therefore, survival teams that go into the area of damage to give first aid will have a triage or sorting responsibility. The survival teams will return to their places of duty those persons with even fairly severe maxillofacial injuries who can breathe and take some kind of nourishment without treatment; these casualties will have little more than dry dressings to cover their lacerations and a head bandage to support fractured facial bones (Fig. 2). This head bandage can serve a twofold purpose: whether the mandible or middle third of the face is fractured, upward pressure by a head bandage will support it well enough for the patient to be evacuated, and effective pressure may be placed in case of facial hemorrhage by using a head bandage that holds extra gauze pads against the area of injury. Casualties who have respiratory obstructions that are readily correctable will have the necessary tongue fixation, positioning,

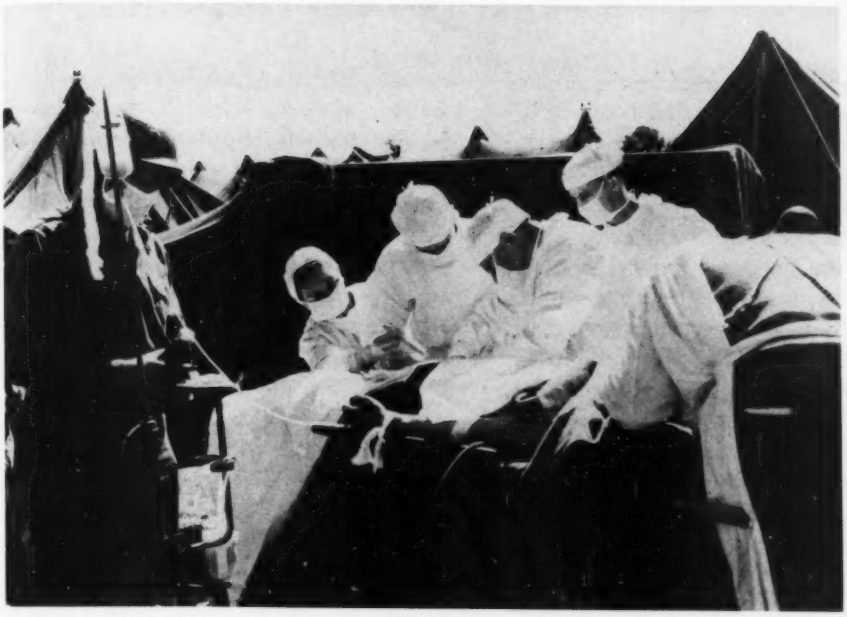

Fig. 3—Collecting point would include some treatment facilities; facilities may be similar to this blanket-partitioned open lot in France used by 24th Evacuation Hospital in World War II

Fig. 4—Sixtieth Field Hospital in France used stage of this theater as an operating room and remainder as preoperative and postoperative ward

or tracheotomy performed by the survival team and will be evacuated to another area that will be a collecting point for casualties.

The collecting point will be the first medical facility to which the casualty will be brought. This facility may be a railroad boxcar, a motel room, or a blanket-partitioned area in a vacant lot (Fig. 3). This facility might be organized into several treatment teams with one person, probably a dentist, administering local infiltration and block anesthetics. The maxillofacial surgery, with only 15 or 20 minutes allotted to each patient, would consist of not more than securing a more effective tracheotomy when indicated, wet debridement, suturing of key facial structures, and simple fracture-corrective measures. Fracture control would be limited to intermaxillary wiring attached to the dentition and direct transosseous wiring in the event of an open, readily accessible fracture. If the number of patients is overly excessive, then both mandibular and maxillary fractures might be treated only by placement of effective craniofacial bandages. Facial lacerations would be treated at this collecting point with only the minimum amount of soft tissue closure that would be a guide to possible future reconstructive surgery; for example, the amount of suturing necessary to bring the ala of the nose back into its position on the labiobuccal line, or the few key stitches that will approximate the vermilion border of the lips. At the collecting point the practice of continuous triage would return to duty all those who could be effective in their homes, refugee centers, or in civil defense or military assignments.

Casualties with such severe maxillofacial injuries that render them unable to be useful would be evacuated from the collecting points to a treatment center (Fig. 4). However, most of the maxillofacial casualties arriving at the treatment center would have been brought there because of other injuries: for example, radiation and thermal burns, thoracic and abdominal injuries, states of shock, and complex orthopedic injuries. Definitive maxillofacial care may be possible at this center, but it is probable that the overwhelming numbers of casualties and the scarcity of medical and dental personnel to care for them would require the elimination of technically complicated or lengthy procedures. As soon as the patient is ambulatory and can manage his own nutritional problems, he would be discharged from the treatment center and would enter into the defense and reconstruction of our country.

■ *Discussion*

From this situation will emerge live people; however, they may have deformities and disabilities, such as scar contractures, voice changes from damages due to emergency tracheotomy procedures, fistulas from the oral cavity, poor dental occlusion or none, and instances of nonunion and malunion of the facial bones due to a lack of skilled surgery, infections and perhaps malnutrition. But these persons will have viable hands and minds to add to the manpower resources.

The best way for the dentist to fit into his community's disaster plans is in the actual treatment of patients. Time and again civilian dentists inducted into the Armed Forces of World War II and the

Korean conflict have proved themselves capable assistants and have provided excellent emergency care to injured men in field medical units. The most effective assistance and care in the future would follow preparation and review of emergency medical procedures by the 90,000 dentists of this country. Fortunately, there are many sources for the individual dentist to draw on to prepare himself and his community to meet a disaster situation more effectively. Some of these include:

1. State disaster planning agencies.
2. American Dental Association.
3. Federal Civil Defense Administration.[15,16]
4. American National Red Cross.
5. Armed Forces Reserve Officers' Training Programs.
6. Textbooks and journals dealing with first aid and resuscitation.[17-19]

A dentist determined to meet his obligations can do so by participating actively in his community's disaster organizations.

■ *Summary*

First aid care for patients with fractures of the facial bones includes establishment and maintenance of an airway and the control of hemorrhage. If it is not possible to effect an early reduction and fixation of fractures of the facial bones, then support by head bandages will make the patient more comfortable and will control tendencies to hemorrhage.

In the event of a massive influx of patients caused by a national disaster, the basic principles of management of maxillofacial injuries will have to be streamlined, but not abandoned. In this situation, the greatest good for the greatest number will be the goal rather than the completion of a few operations with no functional or esthetic facial deformities.—5653 *Guilford Avenue.*

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Subacute bacterial endocarditis: a clinical study

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The dentist must assume the responsibility for preventing the development of subacute bacterial endocarditis in the susceptible patient after dental surgical procedures. A history of rheumatic or congenital heart disease predisposes the patient to subacute bacterial endocarditis in the absence of careful antibiotic prophylaxis. A study of the records of 50 patients between the years 1950-1956 indicates that Streptococcus viridans was the predominant causative microorganism introduced by the dental procedure. Penicillin was an acceptable prophylactic agent. The establishment and maintenance of good oral hygiene in the susceptible patient is stressed.

Dental and medical procedures which require the manipulation of tissue associated with body orifices, and which may produce a bacteremia, are generally accepted as predisposing causes of subacute bacterial endocarditis in susceptible persons.[1-4] In many instances there appears to be a close association between the manipulation of tissue and the onset of the disease. Heart lesions of rheumatic fever and congenital heart disease have been demonstrated to be major predisposing factors in the production of subacute bacterial endocarditis in human beings;[5] any endothelial defect may predispose a person to it, however. The recognition of the relation between organic heart lesions, dental procedures which cause a bacteremia and subacute bacterial endocarditis has resulted in dentists' assuming the responsibility for the prevention of subacute bacterial endocarditis whenever dental procedures which might cause the introduction of microorganisms into the blood stream are to be performed.

It has been shown that a variety of microorganisms may cause subacute bacterial endocarditis and that in most instances an antibiotic is available to combat the microorganisms. The predominant microorganism associated with subacute bacterial endocarditis and also normally present in the mouth is *Streptococcus viridans*. This group of microorganisms usually is well controlled by penicillin.[5-7] This knowledge of a therapeutic agent which will prevent subacute bacterial endocarditis indicates the need to premedicate patients who give a history of rheumatic fever or congenital heart disease with an appropriate antibiotic whenever dental procedures which cause bleeding are to be performed.

The purpose of this study was to determine: (1) the predisposing causes of subacute bacterial endocarditis in the

group of patients studied; (2) the predominating microorganism (or microorganisms) which were principal causative agents in these patients; (3) if penicillin used alone is effective against the principal causative microorganisms; (4) if any change in sensitivity of the causative organism to penicillin had occurred over the six year period studied, and (5) the oral condition of the patients.

■ *Method*

The hospital records were reviewed of all patients with a diagnosis of subacute bacterial endocarditis seen at University Hospital, Ann Arbor, Mich., from 1950 through 1956. Only records which indicated a positive diagnosis either by blood culture or by findings at autopsy were used for the study. In each instance information was obtained from the hospital records relative to the history, physical findings, laboratory findings, and clinical course of the patient's disease. The therapeutic agent shown to be most effective against the causative microorganisms by culture and sensitivity tests was also noted. The records of 50 patients with a positive diagnosis of subacute bacterial endocarditis were studied.

■ *Results and Discussion*

Table 1 reconfirms the importance of rheumatic heart disease and congenital heart disease as predisposing causes of subacute bacterial endocarditis. All but one of the patients demonstrated organic heart lesions in the physical examination.

Table 2 shows an extremely high percentage of patients who gave a history of dental extraction prior to the onset of subacute bacterial endocarditis. None of the patients in whom the disease developed apparently on the basis of the dental procedure had received any preventive antibiotic prior to or following the dental operation. In one instance, which resulted in the death of the patient, the patient had stated that the dentist had refused to provide antibiotic prophylaxis when he was asked to do so.

Also noteworthy in Table 2 is the percentage of patients in whom an upper respiratory infection was the apparent predisposing cause of subacute bacterial

Table 1 • Patients in whom heart disease was associated with subacute bacterial endocarditis

Disease	% patients	No. patients
Rheumatic heart disease	66	33
Congenital heart disease	28	14
Arteriosclerotic heart disease	4	2
History of rheumatic fever only	2	1
Total	100	50

Table 2 • Distribution of 50 patients having subacute bacterial endocarditis and a history of rheumatic fever or heart disease, according to predisposing cause, and percentage of mortality

Predisposing procedure or condition	% patients having procedure or condition	Mortality (%)
Dental		
Extraction	22	4
Scaling	2	
Root canal manipulation	2	
Upper respiratory infection	32	8
Abortion	6	0
Urethral instrumentation, Rectal surgery, Biliary surgery, Cardiac surgery	10	4
Pneumonia	2	0
Unknown	24	4

Table 3 • Organisms isolated in blood culture (number of cases by year)*

Year	Microorganisms						
	Str. viridans	Str. faecalis	Comb. Str. viridans and Str. faecalis	Anhemolytic streptococcus	Hemolytic staphylococcus	Staph. aureus	Gram negative rod
1950	3	1	1			1	
1951	5	2					
1952	7	2					
1953	5						
1954	2			1		1	
1955	7	3			1	1	2
1956	3	1					

*One instance of negative culture determined at autopsy; one patient with subacute bacterial endocarditis diagnosed at autopsy had negative blood culture while alive.

endocarditis. The percentage of patients in whom the predisposing cause is unknown is somewhat disconcerting. The lack of a predisposing factor suggests that a significant number of susceptible individuals may be developing subacute bacterial endocarditis by means of self-induced bacteremias through eating, toothbrushing, gum chewing and neglected minor infections. It is also possible that a predisposing factor may have been overlooked in taking the case history.

Table 3 shows, in spite of a limited sample, that very little year to year change has occurred in the type of causative organism of subacute bacterial endocarditis and also shows the wide variety of microorganisms involved. Table 4 indicates that *Str. viridans* is the predominant microorganism in subacute bacterial endocarditis in instances in which dental procedures are presumed to be the predisposing cause. *Str. faecalis* was involved in two patients in whom a dental procedure was presumed to be the predisposing cause; *Str. faecalis* in both patients was resistant to penicillin used alone.

Table 4 • Microorganisms involved in instances of subacute bacterial endocarditis in which dental procedure was apparently a predisposing cause

Microorganism	No. patients having predisposing procedure	No patients in whom microorganism was sensitive to penicillin used alone
Str. viridans	9	8
Str. faecalis	2	0
Aerobic gram negative rod	1	0
Negative culture	1 (diagnosis at autopsy)	

Tables 2 and 5 show a total of ten deaths in this series of 50 patients who had subacute bacterial endocarditis. This mortality rate is still significantly high in spite of the use of antibiotics to treat the disease. Half the deaths were associated with *Str. viridans* infection. In 24 patients *Str. viridans* was sensitive to penicillin used alone. Table 6 indicates that in 8 instances *Str. viridans* was not sensitive to penicillin used alone; however, there seemed to be no trend for the development of resistant strains in these patients.

The age range in the group of patients studied was 4 to 74 years. Apparently the age of an individual is no index of susceptibility to subacute bac-

Table 5 • Types of microorganisms in patientis who died of subacute bacterial endocardits

Microorganism	No. deaths
Str. viridans	5
Staph. aureus	2
Str. faecalis	2
Undetermined (diagnosis at autopsy)	1
Total	10

terial endocarditis, although it should be noted that 23 of the 50 cases occurred in patients between the ages of 21 and 40 (Table 7). No particular conclusion can be drawn from the sex distribution of patients with the condition (32 male, 18 female).

The oral condition of the patients on admission to the hospital was as follows: good in 11, fair in 7 and poor in 17; 3 patients were edentulous. The finding in 12 instances that no record was made of the condition of the patient's oral cavity on admission suggests that the importance of this region as a potential site of entry in the production of bacteremia is not appreciated fully by the medical profession. In nearly half of the patients admitted to the hospital the oral health was graded as only poor or fair.

■ *Summary and Conclusions*

The hospital records of 50 patients with a diagnosis of subacute bacterial endocarditis were evaluated for the purpose of determining the predisposing causes, the predominating microorganism, the effectiveness of penicillin against the predominating microorganism, any change in sensitivity of the causative microorganism to penicillin and the oral condition of the patient.

The most common predisposing dental cause of subacute bacterial endocarditis was the extraction of teeth in patients with congenital or rheumatic heart disease. All patients with a predisposing dental cause also had predisposing congenital or rheumatic heart disease.

The most common predisposing systemic causes of subacute bacterial endocarditis were rheumatic and congenital heart disease. The most common predisposing nondental cause was upper respiratory infection in patients with a history of rheumatic fever or heart disease.

The predominant causative microorganism in the instances of subacute bacterial endocarditis studied was *Str. viridans*. *Str. viridans* was the predomi-

Table 6 • Sensitivity of Str. viridans to penicillin used alone in instances of subacute bacterial endocarditis, by year

Year of occurrence	No. patients with Str. viridans not sensitive to penicillin alone
1950	0
1951	0
1952	3
1953	1
1954	1
1955	3
1956	0
Total	8

Table 7 • Age distribution of patients with subacute bacterial endocarditis

Age	No. patients
1–10	3
11–20	6
21–30	9
31–40	14
41–50	6
51–60	5
61–70	6
Over 70	1
Total	50

nant causative microorganism in those instances in which a dental procedure was the predisposing cause; it was also the predominant microorganism in those cases of subacute bacterial endocarditis resulting in death. *Str. viridans* was sensitive to penicillin used alone in 24 out of 32 patients.

There was apparently no relation between sex or age and a predisposition to subacute bacterial endocarditis.

The oral condition of most of the patients was poor or only fair.

On the basis of the data in this group of 50 patients, the following conclusions may be drawn:

1. Dental extraction is the most prominent predisposing dental cause of subacute bacterial endocarditis.

2. Penicillin, although not completely adequate, is still acceptable for use by the dental profession for the prevention of subacute bacterial endocarditis, since no significant changes were noted in the types of microorganisms and their sensitivity to penicillin over the period of the study.

3. The significantly high mortality rate (20 per cent) in this series of patients indicates that the production of bacteremias in susceptible individuals without proper preventive treatment is a serious risk of life.

4. In at least eight of the patients apparently predisposed to subacute bacterial endocarditis by a dental procedure, the disease could have been avoided if penicillin had been used for prevention, since in eight instances the microorganism was sensitive to penicillin.

5. Dental procedures should be postponed on patients who have an upper respiratory infection and who are predisposed to subacute bacterial endocarditis; furthermore, these patients should be referred to their physicians for preventive treatment.

6. Subacute bacterial endocarditis can occur at any age in persons predisposed to it; this fact indicates that even though a susceptible patient has had several extractions in the past without the development of subacute bacterial endocarditis, it is possible for the disease to develop in that patient at any time unless he is protected by antibiotics.

7. The mouths of a significant number of patients were considered to be in only fair or poor condition by the examining physician at the time of admission to the hospital; therefore, a careful evaluation of the oral cavity should be made by a dentist for each patient at the time of treatment of subacute bacterial endocarditis so that predisposing dental factors may be removed under cover of a proper antibiotic which has been determined by periodic blood cultures.

The prevention of subacute bacterial endocarditis is still an extremely important consideration for dentists. The results of the study reported here give but a small notion of the loss, both of money and time from active life, that each patient with the disease suffers. The medical aspects of subacute bacterial endocarditis should be of interest to the dentist from the standpoint of the effects of the disease on the patient, the type of treatment, and the length of time required for the treatment of the disease.

The recommendation of the American Heart Association and the American Dental Association's Council on Dental

Therapeutics for prophylaxis against subacute bacterial endocarditis should be followed closely by each dentist who treats a patient with a history of rheumatic fever or rheumatic or congenital heart disease. Such patients should be thoroughly impressed by their physicians and dentists with the seriousness of their medical history and with the necessity for maintaining good oral health. The maintenance of good oral health will eliminate possible sources of self-induced bacteremias, control periodontal disease and dental caries and, therefore, reduce the probability of dental extractions' becoming necessary.

Part of the treatment of patients with subacute bacterial endocarditis should be the establishing of a favorable oral condition while the patient is receiving high doses of antibiotics for the treatment of his disease. It is necessary for the patient to be taught to maintain good oral health. By accomplishing these things in the course of treating subacute bacterial endocarditis, the possibilities for extractions' becoming necessary are greatly reduced and one possible source of recurrent disease is eliminated.

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■ Whetting the Reader's Appetite

Next to the title, the most important section of a medical article is the summary. To the indexer, a properly written summary furnishes the necessary clues for cross-indexing the article. To the busy abstractor, it is a welcome digest of endless pages of printed words. To the assiduous physician, daily flooded with more literature than he can possibly peruse, it is the sample of a product which he must decide whether or not to purchase. But, unfortunately, too many authors fail to take advantage of this opportunity to sell their product by offering their prospective customers a truly representative sample, that is, a concentrated form of the real product. . . . An informative summary should tell the reader as succinctly as possible the reason the paper was written and the salient points made in it. And it is just as important to know what not to include in the summary as what to include. For instance, no new facts should be introduced in the summary that have not already appeared in the body of the paper. Furthermore, there is no need to document statements made in the summary by citing references, as this should have been done in the body of the article. And, finally, reference should never be made in the summary to tabular or graphic material, as this also belongs in the body of the paper. . . . The summary should be a capsule version of the paper. A factual summary is one that will whet the appetite of the reader so that he will go back for a second helping.—*Michael E. DeBakey, Cora and Webb Mading, Surgery, p. 946-947, Nov. 1957.*

Clinical evaluation of sulfadimethoxine, a long-acting antibacterial sulfonamide, in oral infections

■ *Joseph P. Cappuccio,* D.D.S., and Edward C. Dobbs,† D.D.S., Baltimore*

Sulfadimethoxine, a new, long-acting sulfonamide, controlled oral infections in 35 (89.7 per cent) of 39 patients. No untoward reactions were noted. A dosage schedule of four tablets (2 Gm.) immediately and two tablets (1 Gm.) daily thereafter is recommended for acute infections.

For many years, the sulfonamides have been used therapeutically and prophylactically in dento-oral conditions.[1,2] The introduction of broad-spectrum antibiotics with fewer side effects than observed with the early sulfa drugs, has led some members of the dental profession to abandon the use of the sulfonamides. Today, however, there is a resurgence of interest in these agents in all fields of therapeutics due to (1) the development of long-acting sulfonamides characterized by a high degree of potency and low order of toxicity; (2) the increasing emergence of antibiotic-resistant staphylococci, bringing about the need for alternative antibacterials and (3) the increasing occurrence of allergic reactions to antibiotics.

A new sulfonamide which recently came to the authors' attention is sulfadimethoxine (Madribon). The pharmacologic properties of this antibacterial, which especially recommend it for dento-oral infections, are its low dosage effectiveness when given orally and its long-acting potential which permits once-a-day or at most twice-a-day administration. Peak sulfonamide blood levels have been shown to be attained approximately four hours after oral administration of 1 Gm.[3] Measurable amounts are still present after 96 hours, the drug being slowly excreted. A dose schedule of 2 Gm. initially, followed by 1 Gm. per day, produces a blood level of about 7.0 mg. per hundred cubic centimeters and a urinary excretion of 0.8 Gm. per day. It has been postulated[4] that sulfadimethoxine may be metabolized differently from other sulfonamides and that this may account for its lesser toxicity and slower excretion.

The drug was evaluated in a variety of infections, and our interest was stimulated primarily by its successful use in ear, nose and throat infections, where the offending pathogens are generally similar to those encountered in the oral cavity; that is, staphylococci, streptococci and *Escherichia coli*. Elia[5] obtained satisfactory results with sulfadimethoxine in 107 of 111 patients with upper respiratory and ear infections, with no untoward reactions, even though two patients stated that they were "allergic to sulfonamides." Michael,[6] also reporting on diseases of the nose and throat, observed clinical improvement in 33 of 39 patients, with no side effects other than headache in two patients receiving higher than recommended doses. Finegold and others[7] noted a good response to sulfadimethoxine in one patient treated for actinomycosis of the face.

In dentistry, the sulfonamides have been used in treating osteomyelitis, gangrenous stomatitis, alveolitis, ulceromembranous gingivitis, infected fractures, acute cellulitis, periodontal infections, and in root canal therapy.[1] The present evaluation of sulfadimethoxine which is, to the authors' knowledge, the first report on its use in oral infections, is limited to a few of the common disorders seen by the oral surgeon.

■ *Procedure*

Sulfadimethoxine was administered to 41 patients; 20 were outpatients in the department of oral surgery, Baltimore College of Dental Surgery, The Dental School, University of Maryland, and 21 were inmates of the Maryland Penitentiary. The conditions for which antibacterial therapy was indicated are as follows: dento-alveolar abscess (17), cellulitis (12), pericoronitis (7), impactions (2), postoperative infection (2) and alveolitis (1). In the patients with cellulitis, heat therapy was used adjunctively to insure better circulation and to bring more of the drug to the edematous area.

Thirty-eight patients received the drug in tablet form and three received the suspension. Initially, sulfadimethoxine was used at a dose of two tablets (1 Gm.) immediately and one tablet (0.5 Gm.) daily for maintenance. Eighteen patients were treated on this dosage schedule. Since no untoward reactions were observed, and since it was thought that a more rapid response could be obtained at a higher dosage without concomitant increase in side effects, the remaining 20 patients were started on four tablets (2 Gm.) immediately and maintained on two tablets (one every 12 hours) daily, thereafter. The suspension was administered at the lower dosage level—20 ml. immediately and 10 ml. daily. General supportive measures were prescribed adjunctively. The response was classified as "controlled," "swelling reduced" or "improved."

■ *Results*

As shown in the table, the control of infection was observed in 35 of the 39 patients (89.7 per cent). The two patients with impactions, who had slight swelling prior to preventive, antibiotic treatment, showed no swelling or development of infection after three and four days of therapy. The response was graded as improved in one patient with dento-alveolar abscess, whereas in two patients with dento-alveolar abscess and one patient

Table

Response to sulfadimethoxine therapy

Diagnosis	Number of patients	Duration of therapy		Response			
		1 Gm. stat. 0.5 Gm. daily	2.0 Gm. stat. 1.0 Gm. daily	Controlled	Swelling reduced	No swelling	Improved
Dento-alveolar abscess	14	4–6 days	2–4 days	11	2		1
acute	3	5–6 days		3			
Cellulitis	12	6–8 days	3–4 days	11	1		
Periocoronitis	7	3 days	3 days	7			
Impaction	2	3–4 days				2	
Postoperative infection	2	5–6 days		2			
Alveolitis	1	5 days		1			
	41			35	3	2	1

with cellulitis, swellings were reduced.

Analysis of the dose-duration response revealed that in all instances of periocoronitis the infection was controlled after a three-day course of therapy, at both the low-dosage and high-dosage schedules. Generally, however, in the acute disease processes, the response was more rapid when the dosage was doubled. For example, in cellulitis, six to eight days were required with the 1 Gm. daily dosage, whereas three to four days of therapy with a 2 Gm. immediate dose, and a 1 Gm. maintenance dose were sufficient for complete control of the infection. Similarly, in dento-alveolar abscesses, four to six days of treatment were required for control with the lower dosage, whereas, on the average, only two to four days of treatment were necessary at the higher dosage level. None of the patients treated experienced untoward reactions to the drug at either dosage level.

■ *Comments and Conclusions*

Although the number of patients in this preliminary study was limited, it is significant that all patients responded to therapy and that no untoward reactions were observed. Complete control or prevention of infection in 37 of the 41 patients, with improvement noted in the remainder, is considered excellent, particularly since this project was carried out in part on an outpatient basis. This presents a difficult test for any drug. Thus, it compares favorably to results obtained with antibiotics.[8]

These preliminary results justify further investigation of the treatment of oral infections with sulfadimethoxine. In dental extractions, where transient bacteremia is not uncommon,[2] the administration of sulfadimethoxine should serve as an excellent preventive, antibiotic measure, particularly in patients with a history of rheumatic heart disease. In dento-alveolar abscesses, therapy with sulfadimethoxine is indicated, along with extraction of the tooth. It is concluded that this drug, although chemically a sulfonamide, appears to be free of the undesirable effects that previously led to the diminished use of this class of compounds.

■ *Summary*

1. A new, long-acting sulfonamide, sulfadimethoxine, was administered to 41 patients with various oral infections requiring antibacterial therapy.

2. Control of existing infection was obtained in 35 of 39 patients, with improvement noted in four. In two patients with impactions no swelling was observed after three to four days of therapy.

3. No untoward reactions were experienced in this study.

4. A dosage schedule of four tablets immediately and two tablets daily thereafter, is recommended for acute infections; and two tablets immediately, followed by one tablet each day is adequate in pericoronitis.

5. Sulfadimethoxine is a valuable therapeutic aid in the treatment of oral infections, being highly effective and remarkably well tolerated.

Madribon, the brand of sulfadimethoxine used in this study, was supplied by Hoffmann-La Roche Inc.

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■ Radiation Hazards

Over the past five years there have been frequent public debates by scientists about the damaging consequences of the exposure of our store of human genes to atomic radiations. . . . The seemingly contradictory statements have probably left more people confused than reassured. . . . This confusion arises partly because there are many sources of such radiation, and it is not clear . . . whether the damage is greater from medical and dental exposures, from industrial hazards or from the fallout occurring after the testing of nuclear weapons. Confusion is even more definitely attributable to the fact that different "authorities" in good conscience, can speak reassuring words or raise their voices in alarm, when looking at the same facts. And it is partly because there are so many gaps in our present scientific knowledge of how much radiation we are exposed to, internally and externally, how much mutations might result, how harmful these mutations might be, on the average, and what the consequences are to an entire population, as well as to particular individuals, from a given degree of exposure. . . . There is hope in the fact that mankind has acquired in its evolutionary progression not only a particular genetic heritage but also a means of passing on knowledge and of growing in wisdom through experience. . . . Our species will surmount this threat to its continuance even as it has survived the lesser threats of the past.—*Bruce Wallace and Th. Dobzhanski. Radiation, Genes and Man, 1959.*

The future of voluntary prepayment plans for hospital care

■ *John R. Mannix,* Cleveland*

The excellence of dental, medical and hospital care available to the people of this country is primarily a function of the concept of private practice and the voluntary hospital system. Improvement and extension of care is now an economic and moral necessity. A plea is made to the American Hospital Association to take the initiative in forming a complete and broad coverage program of voluntary health services to replace the multitude of plans which now confuse and obscure the advantages of the voluntary concept. The American Medical Association and the American Dental Association are urged to participate in the development of such a plan. As time runs out, the choice will be made for a governmental health system unless a unified, sensible and comprehensive voluntary plan with all its inherent advantages is made immediately available to the American people.

A matter of great concern today is the future of voluntary prepayment plans for hospital care. The basic question, "What is the future of voluntary prepayment plans?" could be answered with another question: "What is the future of our voluntary hospital system?" For the two concepts are inseparable: neither has a future without the other.

Suppose the present voluntary hospital system became a governmental system. It would mean the end of voluntary prepayment plans because there is no room for the voluntary financing of governmental institutions. Reverse the situation. If pressures to enforce compulsory governmental health insurance are successful, it is unlikely that voluntary hospitals will long survive. Under a system of compulsory governmental health insurance, it seems likely that the government would first finance hospital building and operation and then, inevitably, own and operate all hospitals.

Now is any of this happening in either field? Of course it is. Actually, government has made great inroads into the ownership and operation of hospitals, although there is not similar encroachment in the prepayment health field. But regardless of which field is jeopardized first, the other stands in equal danger.

The public asks, "What is so wonderful about a voluntary system?" There is a very good answer to that question. There is substantial agreement that the scientific medical and dental care and the modern hospital care given the American people have reached a degree of excellence never attained before, anywhere in the world.

This excellence of service has been achieved primarily through the private practice of medicine and dentistry and through the voluntary hospital system in the United States, now the only country on earth without a governmental health system. In view of the present high quality of medical, dental and hospital care in the United States, one of the nation's great needs is that attention be given to improving and extending the present system and maintaining those features which have created the present excellent American health services.

■ *Need of Leadership*

We are not going to improve or even preserve this remarkable system without positive leadership. Where are we going to get it?

It seems that the leadership for preserving the voluntary hospital system and the voluntary methods of financing it most logically must originate with the American Hospital Association. The American Hospital Association is primarily an association of voluntary nonprofit hospitals. Its primary purpose is to improve hospital care of the people through elevation of the standards of voluntary hospitals. Its services to governmental institutions are incidental.

There is hardly a place for an independent association of hospitals under a governmental hospital system. Such functions as the American Hospital Association now performs for voluntary hospitals would, under a governmental hospital system, be performed by a department of the government.

If the American Hospital Association truly believes in the voluntary hospital system, then that association, as the only official nationwide voice and action body of voluntary hospitals in the United States, must take active leadership in the preservation, extension, improvement, financing and all other aspects of the voluntary hospital system.

There is nothing startling or revolutionary in this proposal. The American Hospital Association in January 1933 took the leadership in the formation of voluntary prepayment plans for hospital care. It put into being a set of standards which have become the basis of the operation of Blue Cross voluntary hospital plans. There can be no question that the real leadership in the development and extension of voluntary prepayment plans for hospital care, prior to World War II, originated with the American Hospital Association.

However, since the war years, many have wondered whether the American Hospital Association has continued to exert the same leadership and to show the same fervor for the voluntary system of hospital financing that it did in the early years. There are some who feel that as Blue Cross plans gained in maturity there was a tendency on the part of the American Hospital Association to feel that its leadership and its guidance were no longer necessary.

During its early years with its willingness to pioneer, Blue Cross, supported by the American Hospital Association, had a spectacular growth. This growth continued throughout the depression years of the 1930's and throughout the prosperous years of World War II. During the depression years and the war years, hospital costs and use were maintained

at artificially low levels for many reasons, including the following:

1. Limited hospital income made it impossible for hospitals to pay salaries commensurate with those paid in industry and other activities. During the war years hospital salaries and wages were frozen at the low levels that existed during the prewar period.

2. Limited resources forced hospitals to maintain a very long work week for employees. Hospital work weeks of 48, 52 and even longer hours, were common.

3. Limited capital funds made it impossible for hospitals to expand their facilities to meet the needs of the expanding population. During the war years government restrictions on construction prevented the building of additional hospital beds for the growing population needs.

4. During the war years great numbers of physicians, nurses and skilled technical hospital personnel were in the Armed Forces, and not available to civilian hospitals. Hospitals found it difficult to maintain their normal complement of semiskilled and unskilled personnel because of competition with the high salaries and wages paid in war industries. Hospitals had to rely to a great extent on volunteers.

5. During the war, the shortage of physicians, nurses, technical and other personnel, forced some hospitals to close existing beds because they were unable to man these facilities. This resulted in hospitals being forced to return the sick and injured to their homes at a much earlier date than was generally believed to be desirable.

6. During the war, many persons engaged in the war industries were working extremely long hours. Sixty and seventy-hour work weeks were not unusual. Often both husband and wife were working. These persons enjoyed very high incomes with premium pay for overtime work, and in many cases they delayed needed hospital care for elective types of conditions until after the war.

After World War II, doctors, nurses and highly skilled technical and unskilled personnel were again available to civilian hospitals. Hospitals were able to open closed beds. Persons who had been engaged in war industries and delayed needed hospital care demanded such care. Hospitals were forced suddenly to expand greatly their facilities to take care of the increased population, for whom no appreciable number of hospital beds had been built during the previous 15 years. Hospitals were obliged to adopt a 40 hour work week for employees, and to pay wages and salaries more commensurate with those in industry.

These factors, combined with the fact that hospital services can be mechanized only to a limited degree, and the nationwide inflation which followed World War II, resulted in skyrocketing hospital costs and in skyrocketing costs to Blue Cross.

Some Blue Cross plans were convinced that this new demand by the American public for comprehensive health service, with equitable payment to hospital personnel, would be a continuing one and believed that the American people were willing to pay any reasonable cost for such service. However, many Blue Cross plans were fearful not only of in-

creased costs, and the broader coverage which the public was apparently demanding, but even of continuing the existing levels of coverage. The result was that many Blue Cross plans proceeded to restrict benefits in various ways, introducing deductible and co-insurance features, and subscriber rates based on individual group experience. For the first time an attitude of caution entered the Blue Cross field and the early spirit of pioneering in providing comprehensive health coverage for everyone at community-wide rates, began to fade, and the earlier leadership of the American Hospital Association did not seem to continue with the same vigor.

After World War II, health benefits became a matter of nationwide bargaining between national employers and labor unions. While this was occurring, many of the country's largest employers began requesting uniform nationwide health coverage for their employees. Previously such employers had permitted local divisions to make local decisions regarding health benefits. In many cases, Blue Cross was not ready to meet the new challenge. Blue Cross had devised one of the greatest voluntary systems the world had ever known for financing health care, and yet it was now becoming cautious in the maintenance and extension of the very principles that had made it great.

During the 14 years since the end of World War II, inflation has continued and increased costs of salaries and wages in hospitals are perhaps higher in terms of percentage than the cost of wages and salaries in any other activity. The continued advance in medical science and improvement in medical and hospital care, plus the increased demand for hospital services, have combined to cause a relentless skyrocketing of hospital costs.

During this period, little has been done by either Blue Cross, hospitals or the medical profession to inform the public of the many factors involved in rising hospital costs. Little has been done to point out that hospital care at its present cost is still one of the greatest bargains available to the American people. Hospital care for the entire family can be obtained at rates of 35 cents a day or less. In other words, the daily cost of hospital care for the family is approximately the cost of a package of cigarettes or a gallon of gasoline. It is less than the cost of public transportation that most workers pay to go to and from work. Hospital care can be purchased for the entire family for a year for less than the cost of insurance on a single automobile. The public has not been made aware of the value of hospital care.

It is only natural that this has resulted in sharp public reaction to the rising cost of hospital and medical care, and brought demands for investigation and control of Blue Cross and hospitals.

■ *The Present Situation*

Meanwhile, what lesson, what conclusion can be drawn from this historical review? It is believed that there is one great lesson to be learned: What is needed is a renewal of the leadership of the American Hospital Association, and a return to the enthusiasm and pioneering spirit which made Blue Cross one of the greatest social phenomena of the century.

There should be a return to the principles of extending the broadest possible coverage to everybody, a return to the principle of extending such broad

coverage on a community rate basis within the broadest possible use of the law of averages, a return to all these principles which during the early history of Blue Cross contributed to its rapid growth and phenomenal acceptance by the people.

However, this can no longer be accomplished by 80 or more individual Blue Cross plans and 70 Blue Shield plans offering a variety of rates and benefits, with a great variety of enrollment regulations. It cannot be accomplished by six national organizations, namely: the Blue Cross Commission, the Blue Cross Association, Health Service, Inc., the Blue Shield Commission, Medical Indemnity of America and the Joint Operating Committee. The time has come when there must be a nationwide coordination of all these organizations, while preserving to the greatest degree possible the autonomy of the present local plans.

If voluntary hospitals are to be preserved, the American Hospital Association must reassert its leadership in the voluntary financing of hospital care, and it should never abdicate its leadership in connection with the financing of hospital care, any more than it should abdicate its leadership in connection with preserving and improving the quality of such care.

■ *Voluntary or Governmental Hospital System*

Basically the question which the American Hospital Association, the hospitals and, ultimately, the American people, must decide, is whether to have a voluntary or a governmental hospital system in the United States. Every right thinking person will prefer a governmental system if there is evidence that it will produce higher quality hospital care for the patient.

However, everyone must do everything in his power to preserve and improve the voluntary hospital system when all the facts available to us indicate that such a system produces higher quality hospital care. It is believed that all serious students of American health service will agree that there are greater values in the voluntary system.

There is little chance of long continuing a voluntary hospital prepayment system with a government-controlled hospital system. There is little chance of continuing a voluntary hospital system under a governmental compulsory health insurance program. But this interrelationship and interdependence goes even deeper.

■ *Cooperation of Medicine and Dentistry*

What would be the prospect of continuing the private practice of medicine or dentistry in conjunction with a governmental hospital system? Very slim indeed. This means that the American Hospital Association must seek and obtain the cooperation of the American Medical Association and the American Dental Association and that all three must demonstrate cooperative leadership. This leadership is their collective mandate to preserve, extend and improve the private practice of medicine and dentistry, the voluntary hospital system and voluntary financing of these services.

If it is agreed that the private practice of medicine and dentistry, the voluntary hospital system and the voluntary financing of these services should be preserved —and this conclusion should be drawn

only if it is sincerely believed that the people of the United States will secure better health services through a voluntary program—then what is to be done about it?

Something can be done, but it is likely to be done only if outstanding leadership is exerted first by the American Hospital Association. The rewards, measured in the future quality of health care of the American people, are tremendous. The task likewise is tremendous. It is a task for leaders with great vision.

The proposal that follows is not new. It was in most of its details presented over 15 years ago. The fact that it has not been implemented in the interim does not in any way detract from its validity. It may suggest that when it was first presented "its time had not come," but time has raced by. The question now is: Does time remain for American medical, dental, hospital and other health leaders to grasp the opportunity available to them?

■ *American Blue Cross*

The opportunity is to deliver into the hands of the American people a complete program of voluntary health services. The opportunity available to health leaders in the United States is no longer available in any other country on earth. All of them have forfeited the voluntary approach and imposed upon government the responsibility for providing health services. The opportunity is this: That the American Hospital Association take the lead in organizing an "American Blue Cross," and that the association take immediate steps to obtain a federal charter under which the American Blue Cross would operate in the public interest.

What would be some of the characteristics of the American Blue Cross? It should include the following features:

1. It should be a voluntary, nationwide organization.

2. It should be under the sponsorship of hospitals, medicine and dentistry, with additional representation on its board of trustees from agriculture, labor and management, preferably appointed by the President of the United States.

3. It should assure the individual of free choice in the selection of a physician, dentist or hospital. There should be no interference in the professional relations between physicians, dentists and patients; or between physicians, dentists and hospitals.

4. It should place emphasis on the public welfare and be nonprofit in operation. Any surplus which might develop should be used for the benefit of subscribers in the form of reduced rates or increased benefits.

5. The ultimate economic responsibility of providing hospital, medical and dental benefits under the plan should be assumed by hospitals and the professions through definite contractual agreements. This arrangement would be similar to that now covered by contract at local levels.

6. Benefits should be comprehensive on a service basis, with an absolute minimum of restrictions and limitations.

7. Benefits should be available to everybody, including urban and rural population, and to all age groups. Provision should be made for the unemployed and retired persons. Provision should also be made for the indigent, preferably

through contractual arrangements with local governments.

8. There should be maximum spread of risk with special consideration to providing benefits to the unemployed, retired and older age groups at rates they can afford to pay. There should be encouragement of participation by all employers in the cost of care, similar to the programs now followed by many employers, so as to keep the direct cost to the individual at a minimum.

9. There should be provision for cooperation between physicians, hospitals and prepayment plan officials so that only those services necessary for diagnosis and treatment of the patient would be provided. Control of utilization of services must remain with physicians, preferably through the organized medical staff of the hospital.

10. There should be provision for scientific, community-wide planning of hospitals and other health facilities to ensure facilities adequate to meet needs but prudently planned to prevent financial burden possible to the community through excess building.

Such a plan would not only provide economic stability in health care, but would also stimulate further scientific research and progress. The plan, however, must be free of political control and compulsion. These restrictions are objectionable not only to the professions and hospitals, but, what is more important, they are objectionable to the great majority of the American people.

Although it is proposed that the American Hospital Association take the lead in the organization of the American Blue Cross, it is imperative that the American Medical Association and the American Dental Association be urgently requested to assume joint sponorship. Every effort should be made to have these three national organizations join in the sponsorship, but the American Hospital Association should proceed with the proposed organization if at this time the other two national organizations found it advisable not to join. If the American Hospital Association finds it necessary to proceed without the other two organizations at this time, there still should be provision for the American Medical Association and the American Dental Association to cooperate at a later date.

It is suggested that a federal charter for the American Blue Cross be requested from the United States Congress. This would be similar to the federal charters under which the American Red Cross and the American Legion now operate. The hospital representatives on the board of trustees of the American Blue Cross should be appointed by the American Hospital Association with medical and dental representatives appointed by the American Medical Association and the American Dental Association.

Such a federal charter should provide that the purpose of the American Blue Cross is to aid in the promotion and extension of adequate medical, dental and hospital care, education and research in the health field, and to provide adequate financing of these services.

There should be a provision for the consolidation of the activities of the Blue Cross Commission, the Blue Cross Association, and Health Service, Inc., with the American Blue Cross. Likewise, if the

American Medical Association cooperates, provision should be made for the consolidation of the Blue Shield Commission and Medical Indemnity of America with the new organization.

To carry this work to the local level, it is proposed that the American Blue Cross grant charters under which local, voluntary, nonprofit health plans in the various states and territories of the United States would be licensed. Local plans should be given a maximum degree of autonomy.

■ *Health Benefits and Costs*

Benefits should be in terms of hospital, medical and dental services, rather than on a cash indemnity basis. There should be complete reciprocity of service benefits by all local plans. Hospital benefits should include all hospital services for both inpatients and outpatients.

Care should be offered in all types of conditions for which the patient is hospitalized, including communicable disease, tuberculosis and nervous and mental conditions. Consideration should also be given to the provision of hospital benefits without time limitation, leaving the length of stay of the patient to the discretion of the attending physician to be determined in light of medical need. There should be provision for home care programs, including visiting nurse services, to permit transfer from hospital to home at the earliest possible time and to provide home services in instances of prolonged illness.

The medical and dental services offered through companion medical and dental plans should be similarly comprehensive. Complete medical care on a service basis should be provided to persons in the medium and low income groups, with liberal allowance for the cost of medical services to persons in the higher income groups.

Only the care of industrial accident cases and diseases for which the employer is responsible, and care in governmental hospitals where the government has accepted financial responsibility, should be excluded from coverage.

There should be provision for constant research in conjunction with cost and use of hospital and other health services, so that the cost to the public can be kept as low as possible, consistent with a high quality of service.

■ *Payments to Hospitals, Physicians and Dentists*

Hospitals must be paid adequately for their services. Such reimbursement should be based on full cost of care with allowance for depreciation and should be in accordance with the principles of reimbursement recommended by the American Hospital Association.

Physicians and dentists must be paid adequately for their services. The various specialty groups in each state society should recommend reasonable fees for each service following a schedule of relative values already adopted in many states. Such fee schedules should cover full payment of care for all subscribers in the middle and low income groups.

■ *Opportunity for Leadership*

The question whether or not we are to have a governmental health system in the United States will be decided affirmatively tomorrow, unless the leadership of

the American Hospital Association together with that of the American Medical Association and the American Dental Association, develops a nationwide, alternative voluntary system today.

Time is running out. Nevertheless, this proposal should not be undertaken as if it were the consequence of duress. What is proposed here is the free action of free men toward broad objectives that in the light of every moral, social and humanitarian consideration are logical and right.

What is proposed is the joint development of a nationwide voluntary health system by the nation's hospitals and medical and dental professions. Blue Cross and Blue Shield have proved the economic soundness of such a system, which has already reached a very high degree of development.

Nothing should be permitted to interfere with the democratic and ethical values that have lifted the American health system to its present degree of excellence. The proposal made here can contribute to the extension of the best qualities of American health practice.

Reduced to its essentials, what is proposed here is a nationwide voluntary system of health services, voluntarily financed. It is imperative that there be unity of purpose among and unity of action by leaders in the hospital field, the medical and dental professions and prepayment health plans. It may seem that the details barring rapid progress are considerable. Actually they are not. The first necessity is the demonstration of leadership by the American Hospital Association, then a maximum degree of cooperation by the medical and dental professions, and then, agreement upon principles. From that point on, details can be resolved by men of integrity with a natural community of interest.

American medical, dental, hospital and other health leaders stand on the threshold of the greatest era of health progress the world has ever known. An opportunity to develop a voluntary system of health services without parallel in history lies fully within their grasp. Gestures have been made toward that opportunity. Leadership and cooperation now will mean delivery into the hands of the American people of a complete program of voluntary health security.—*2042 East Ninth Street.*

Presented at the annual meeting of the American Hospital Association, New York, August 25, 1959.
*Executive vice president, Blue Cross of Northeast Ohio.

■ The Morality of Research

When the value of a treatment, new or old, is doubtful, there may be a higher moral obligation to test it critically than to continue to prescribe it year-in-year-out with the support merely of custom or of wishful thinking.—*F. H. K. Green, The Lancet, April 26, 1958, p. 902.*

VOLUME 18 • MAY 1960 • NUMBER 3 CASE REPORTS

Penetration of tissue by grease under high pressure: *report of case*

■ *Donald N. Shapiro,* D.D.S., Ferndale, Mich., and Edward C. Hinds,† D.D.S., M.D., Houston, Texas*

Oil and grease, found almost everywhere in this age of massive industrialization, have been subjected to surprisingly meager investigation regarding their action when injected under high pressure into the deeper tissues. The first report, apparently, was not published until 1937, when Reese[1] investigated a case of accidental injection of a finger by fuel oil. Typically, the patient did not realize the gravity of the accident at the time of occurrence, and did not seek treatment until severe pain was experienced 24 hours later. The digit, at first innocuous in appearance, was treated conservatively for seven days, after which the tissues underwent liquefaction necrosis with the superimposition of secondary infection. Amputation of the finger was finally performed, but the stump took two months to heal.

In 1938 two more cases,[2] both involving injuries to the hand from a jet of oil propelled out of a diesel engine injector, were reported. In the one accident the patient again was not seen until 24 hours after the injury and, in spite of incision and drainage, the distal phalanx became necrotic and had to be amputated. In the second instance, severe pain compelled the patient to seek treatment after eight hours, although the finger appeared normal in every respect. Forty-eight hours later, however, the tissues underwent a bluish discoloration, and incision was made and drainage instituted, liberating a small amount of purulent material which showed no growth on culture. The finger improved slowly and finally healed in two months with some loss of function. Dial,[2] who reported these two cases, attempted to determine the nature of this type of injury by injecting small amounts of fuel oil beneath the skin of rabbit ears. In each instance a sterile abscess was formed without local heat or redness, from which he concluded that oil, in itself, is toxic.

Smith,[3] in 1939, reported the case of a mechanic who, while lubricating a passenger car, injected grease under 7,000 pounds of pressure into the volar base of his left index finger. In what has since formed the classical picture, the patient presented himself for treatment late, with his finger and hand slightly swollen although not tense or grossly edematous. He was in severe pain. In spite of the fact that in this instance incision and drainage were instituted immediately and the hand soaked in ether, moist gangrene developed and the finger had to be amputated. As in all the other reported cases, healing was exasperatingly slow, with grease appearing on the dressings for a period of five weeks. Micropathologic examination revealed numerous subcutaneous abscesses, with large numbers of polymorphonucleocytes and considerable necrosis of the subcutaneous tissues. Another case,[4] this one reported recently, followed a similar pattern: edema, gangrene and, eventually, amputation.

In what is probably the most comprehen-

sive investigation of these so-called grease-gun injuries, Meson and Queen[5] reviewed the whole complex of factors involved and, consequently, were able to divide the course of an untreated grease injection injury into three stages:

Stage I. (Early). Swelling and numbness. Unless the grease is removed, edema and pain develop, with gangrene likely on the third or fourth day. An important factor which may modify this stage is the site of injection. If the location has a liberal amount of areolar tissue, the initial reaction and later complications may be less severe.

Stage II. (Intermediate). Development of hard palpable nodules.

Stage III. (Late). Anywhere from 3 to 12 years later ulcers, abscesses, and regions of sclerosis and hyalinization may form and undergo malignant degeneration. These may be some distance from the site of original injury, but whether this phenomenon is due to mechanical pressure or to lymphatic transport is not known.

To the authors' knowledge, all the available literature on this subject deals with injury to the extremities, especially the hand. Therefore, the following case is presented to illustrate what may occur when the facial tissues are invaded by grease under high pressure.

REPORT OF A CASE—On May 20, 1957, at 5 P.M., a 30 year old white man on a stretcher was admitted to the hospital emergency room. He gave a history of being hit in the face early that morning by a bolt and a stream of lubricating grease while manipulating the track adjustment cylinder on a large diesel tractor. He stated that the opening through which the grease was ejected was about the diameter of a large pin, and although he did not know the exact amount of pressure under which the grease was propelled, he estimated it to be "at least several thousand pounds." There was no history of unconsciousness. He had been seen at a nearby hospital soon after the accident and had been given emergency treatment, which consisted of medication for pain, penicillin 800,000 units with dihydrostreptomycin 1 Gm., and a tetanus toxoid booster. He was then transferred to this hospital for further treatment.

PHYSICAL EXAMINATION—Examination revealed a well-nourished, well-developed white man in acute distress. At the junction of the nose and left cheek there was a penetrating wound approximately 1.5 cm. in length, and an apparently superficial laceration, somewhat curvilinear in shape, angulating in the direction of the tragus of the left ear. The cheek in this area appeared to have some fullness, but there was no edema or local heat, and only slight redness was present. The left nostril had been packed with gauze and intranasal examination was deferred. The oral temperature was 101°F. All other findings were irrelevant.

Roentgenograms were negative for fractures, but revealed a diffuse opacity to the left of the nose. There was no evidence of fluid accumulation in the antrums.

TREATMENT—The patient was immediately started on penicillin 800,000 units with dihydrostreptomycin 1 Gm. every 12 hours, and an infusion of 1,000 cc. of 5 per cent dextrose in water begun. The same evening, at 7:50 P.M., under premedication of meperidine hydrochloride 75 mg., the patient was taken to surgery and the region infiltrated with lidocaine hydrochloride. Bimanual compression of the left cheek produced a thin ribbon of thick, honey-colored grease. The total amount of grease milked from the tissues in this manner was about 30 cc. Exploration of the wound revealed penetration of the periosteum overlying the anterior surface of the left antrum, although there was no break in the continuity of the bone. There was a tear in the nasal cartilage which communicated with the entry wound in the region of the middle turbinate. The linear wound on the cheek was perceived to be no more than an abrasion, and probably represented the path of the projectile before it actually entered the tissues. After mechanical cleansing and irrigation with a saline solution to which had been added 500 units of bacitracin per cubic centimeter, the tissue was loosely closed with two no. 00000 Dermalon sutures and the left nostril packed with chlortetracy-

Fig. 1—Swelling still present in spite of application of hot saline compresses

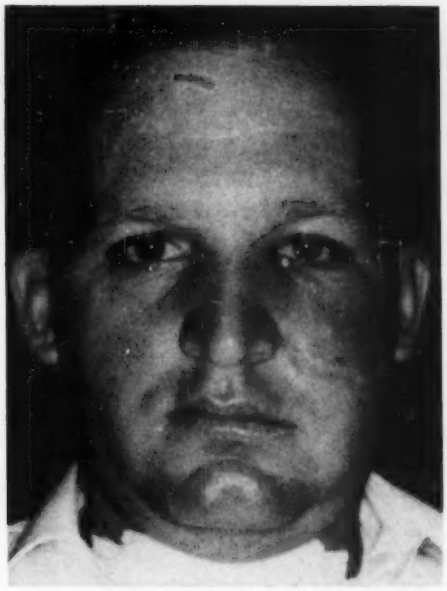

Fig. 2—View taken June 15. Large amount of swelling still present

cline-impregnated gauze. Cold compresses to the face for 20 minutes every two hours were ordered for the first postoperative day, and the antibiotics continued. Meperidine hydrochloride was given for pain and the patient placed on a liquid diet.

COURSE—There was severe pain on the day after surgery. This was adequately controlled by increasing the dosage of narcotic. Swelling was extensive and tender to touch. On the second postoperative day, May 22, the patient complained of frontal headaches. He was also having chills, chest pain, and difficulty in swallowing. Temperature was 102°F. The swelling had become massive and was beginning to extend into the neck. Later in the day the patient started to experience difficulty in breathing, at which time he was taken to surgery and a tracheostomy performed under local anesthesia.

Resolution of the swelling continued to be delayed, in spite of frequent applications of hot saline compresses (Fig. 1). The headaches persisted, and the patient was restless and slept poorly. On May 25 meprobamate, 400 mg. four times daily, was ordered and this appeared to control the restlessness. The headaches continued, although reduced in frequency and intensity. The temperature continued to fall by lysis and there was gradual diminution of the swelling. The nasal packing was removed on May 26 and the tracheostomy tube the next day. The patient was discharged on May 29 to be followed as an out-patient. Periodic examination thereafter revealed exceedingly slow reduction of the tumescence. On June 15 there was a large amount of hard swelling still present which was tender to palpation and exuding a grease-like substance from the original puncture wound (Fig. 2). Three weeks later the wound had finally healed, but drainage was now occurring in the abraded area (Fig. 3). Within another month all drainage had ceased

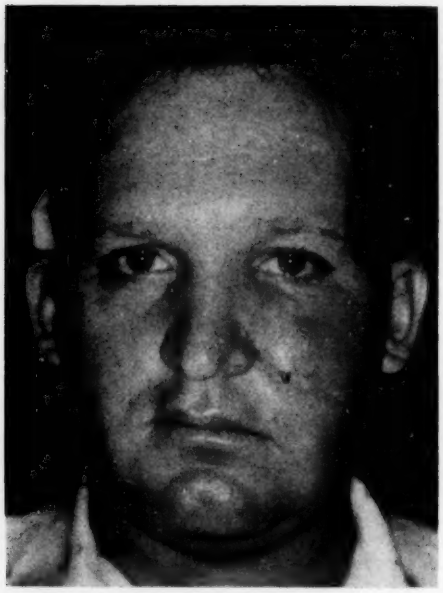

Fig. 3—View taken three weeks later. Drainage in the abraded area

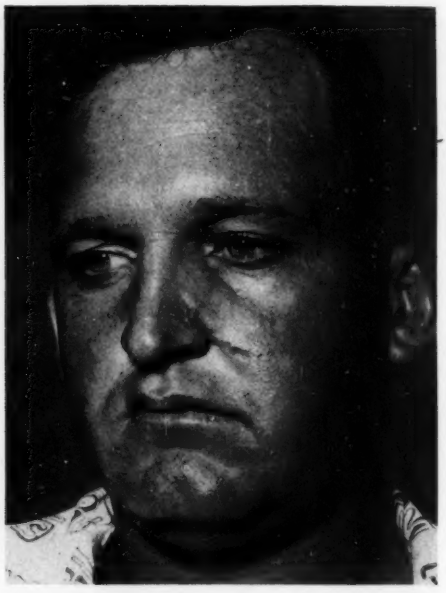

Fig. 4—Ten weeks postoperatively. All drainage has ceased

and the patient was comfortable, although he exhibited a scar which seemed inconsistent with the extent of the original injury (Fig. 4). At the present time the patient is being followed closely for any changes in the residual nodularity. If these regions persist they will be removed surgically at some later date, as the carcinogenic qualities of oleagenous substances have been well documented.[6]

On March 5, 1958, an indurated region in the cheek was excised and found to be a benign inflammatory process in reaction to some retained grease.

DISCUSSION—Despite the fact that most, if not all, of the literature dealing with grease-gun injury is confined to the extremities, the present authors were able to find many striking similarities between those instances and the one reported herein. In each instance the initial appearance of the injury was treacherously deceptive. Swelling was minimal, and there were no signs to indicate the alarming complications which were to follow. It is our belief that deposition of grease deep within any tissue of the body is a situation which should be viewed with the gravest concern. Although investigators agree that confinement of the grease within an inelastic space, such as the tip of the finger, contributes greatly to the violence of the reaction, one should not be lulled into a false sense of security if the site of injection happens to be liberally supplied with areolar tissue. In the case presented, in spite of the fact that the grease was deposited in distensible tissue, there was an explosive physiological reaction. The precise reasons for this are still obscure. Grease is usually sterile when sold, and its pH very close to neutral; and because the tractor which was being assembled by the mechanic in this instance was new, contamination of the lubricant by road dirt cannot be offered as an explanation. It would seem to follow that some substance in the grease itself (perhaps the oil additive, since fuel oil has been reported to elicit a similar response from tissues) is highly

irritating and toxic. The exact nature of the irritant, however, appears to be as yet unidentified.

On the basis of our experience with this case, added to what other investigators have reported, we conclude that:

1. Given a history of invasion of the tissues by grease under high pressure, surgical intervention should be carried out immediately.

2. Incision and drainage, with firm manual expression of all free grease, should be performed without delay—even in the absence of edema, hyperpyrexia, or pain.

3. Tracheostomy should be considered when the facial tissues are involved, and should always be performed prophylactically if the injection occurs below the mandible and above the clavicle.

4. Antibiotics should be administered to guard against secondary infection, and tetanus anti-toxoid given.

5. The use of ether or similar agents for soaks or irrigation is of doubtful value when the grease has been forced deep into the tissues; they may be of some value, however, in the superficial cleansing of the wound.

6. The patient should be recalled for regular examination over an extended period of time, in order to detect the possible development of delayed sequelae, including carcinoma.

SUMMARY—The literature concerning the penetration of the tissues by grease under high pressure was reviewed. A patient was seen who had been struck in the face by a bolt and a stream of lubricating grease while working on a large diesel tractor. The factors contributing to the chain of events following the injury have been discussed together with a suggested approach to treatment.—22720 *Woodward Ave.*

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†Bertner professor of surgery, University of Texas Dental Branch.

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■ Oral Examinations

For early cancer diagnosis, inclusion of an oral dental examination in the physical evaluation given patients on hospital admission is proving valuable, according to Veterans Administration. VA hospitals adopted the technic about two and a half years ago, and have since reported some 700 cases of malignancies of the mouth, tongue and throat which might otherwise have developed unnoticed until too late for successful treatment—*Hospitals 33:21:66 Nov. 1, 1959.*

Surgical repair of a severed parotid duct: *report of case*

■ *Harold E. Boyer,* D.D.S., M.Sc.D., Louisville, Ky.*

Severance of the parotid duct is not a common surgical problem. A survey of the literature reveals little information on the surgical management of parotid duct injuries. This case is reported because of its unusual interest and the challenge it presented for a functional surgical repair.

HISTORY—On June 15, 1955, a 29 year old Negro man was admitted to the oral surgery service at Jackson Memorial Hospital, Miami, with the diagnosis of a severed left parotid duct. His chief complaint was a painful swelling of the left cheek.

HISTORY OF PRESENT ILLNESS—The history dated back to May 25 at which time the patient had been involved in a fight. He had received multiple facial lacerations including a deep S-shaped razor wound of the left cheek which was located over the left zygomatic arch and extended approximately 2 cm. superior and inferior to the arch (Fig. 1).

The patient received treatment in the emergency ward at Jackson Memorial Hospital where the wounds were debrided and sutured. The patient was then discharged from the emergency ward to be followed in the surgical outpatient clinic.

On May 31 the patient returned to the hospital complaining of a painful swelling of the left cheek. He was admitted to the surgery service with the diagnosis of an infected hematoma of the left cheek. A painful swelling approximately 2 cm. in diameter was described, located over the left zygomatic arch. The swelling was aspirated and dark blood was obtained in the syringe. The patient was instructed to use hot soaks on the left side of his face and was started on antibiotic therapy. He was discharged from the hospital feeling fairly comfortable.

On June 6 the patient again returned to the outpatient clinic with the same complaint of a painful swelling of the left cheek as previously described. The patient was then referred to the oral surgery clinic for consultation. Further questioning of the patient revealed an increase in both the extent of the swelling and intensity of pain during mastication. A sialogram was made which revealed a pooling of

Fig. 1—Lateral view showing S-shaped scar traversing the left side of patient's face, May 25, 1955

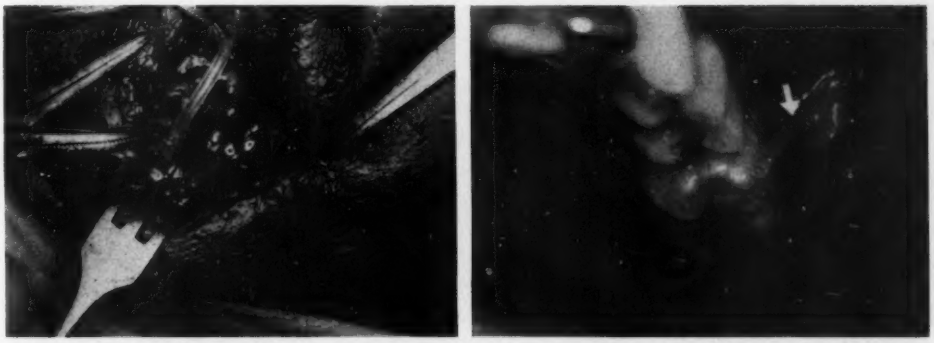

Fig. 2—Left: View of surgical field, June 16, 1955, illustrates severed parotid duct. Hemostats are clamped on proximal and distal ends of divided duct and polyethylene catheter is being inserted into duct. Severed duct was approximated and sutured with catheter in place. Right: Intraoral view shows positioning of catheter through duct orifice into oral cavity

contrast medium in the left cheek confirming the tentative diagnosis of a severed parotid duct.

The patient experienced great relief on aspiration and returned on two occasions requesting aspiration of the swelling and refusing surgery. However, the patient was admitted on June 15 for surgical repair.

PAST MEDICAL HISTORY—The patient had suffered a traumatic injury to the right eye in 1953 resulting in blindness of the right eye and loss of coordination. The remaining history was essentially negative.

PHYSICAL EXAMINATION—The physical examination showed blood pressure 135/85; pulse 80; respirations 20.

The patient had a considerable swelling of the left side of the face approximately the size of a hen's egg. It was located below the zygomatic arch and lateral to the masseter muscle. The swelling was firm but fluctuant. A large S-shaped scar traversed the left cheek with no evidence of a communicating fistula.

Intraoral examination revealed extremely poor oral hygiene. The mucous membrane of the left cheek was normal. Examination with a probe showed the distal two thirds of Stenson's duct to be patent. The facial swelling could not be palpated intraorally.

A slight facial weakness involving the left upper lip was evident. The remaining physical findings were noncontributory. The impression was a severed left parotid duct and facial weakness on the left side.

LABORATORY EXAMINATION—Laboratory examination revealed the following: hemogram, essentially normal; urinalysis, essentially normal; and serologic tests, nonreactive.

The sialogram taken June 6 revealed a pooling of contrast medium in the left cheek.

TREATMENT AND COURSE—On June 15, the patient was admitted to the hospital and the routine history, physical examination, and laboratory examinations were carried out in preparation for surgery.

On June 16 he was premedicated with meperidine hydrochloride (100 mg.) and Hyoscine (1/150 grain) one hour before surgery.

Under endotracheal anesthesia, cyclopropane-oxygen-thiopental sodium-curare, the patient was prepared and draped in the routine operating room manner. Intraorally, the orifice of the left parotid duct was located and a probe inserted into the duct. The patient's head was then rotated to the right and an incision was made on the left cheek along the anterior border of the old scar extending in a semilunar manner

Fig. 3—Postoperative view, August 4, 1955, revealing normal facial contour

for approximately 4 cm. The incision was carried through the skin and approximately 10 cc. of a straw colored fluid was released immediately from a superficial cavity. It was assumed that the fluid was parotid secretion that had accumulated in the cheek as a result of the severed duct; however, material was taken for culture which was later reported negative for growth of microorganisms. The flap was retracted and the cavity was well visualized, measuring 3 cm. in diameter. Along the anterior border of the cavity the previously passed intraoral probe was seen projecting through the retracted distal segment of the severed parotid duct. The proximal segment retracted into a mass of fibrous tissue leaving a gap of approximately 2 cm. from the distal segment to the proximal segment of the duct. Both segments were dissected free and the cut ends of the ducts were freshened. A section of 19 gauge polyethylene catheter was passed into the proximal duct and into the parotid gland (Fig. 2, left). As the catheter was passed, secretions from the gland could be seen climbing to a level in the catheter. The anterior end of the catheter was placed over the end of the probe and the catheter was directed through the distal segment of the duct as the probe was withdrawn into the oral cavity. The proximal and distal ends of the duct were approximated over the polyethylene catheter and sutured with no. 34 gauge stainless steel wire. The previously described superficial cavity in the cheek was obliterated as the wound was closed in layers.

Intraorally, the polyethylene catheter was cut and sutured to the papillary orifice (Fig. 2, right). The patient left the operating room in satisfactory condition.

POSTOPERATIVE COURSE—The patient had an uneventful postoperative course. In addition to the routine postoperative orders, the patient was started on tetracycline therapy. Daily progress was satisfactory, and on the fourth postoperative day the facial sutures were removed.

On the seventh postoperative day, the patient was discharged from the hospital. The facial swelling had subsided completely and the facial incision had healed. Parotid secretions passed freely into the oral cavity through the polyethylene catheter. The patient stated that he was comfortable and was given an appointment to be seen in the oral surgery outpatient clinic. He was not seen until the sixth postoperative week. At that time he stated that he had removed the catheter the second postoperative week and that his progress had been excellent; therefore, he had no reason to return to the clinic. On examination, the patient was found to have completely recovered. Parotid secretions were directed into the oral cavity through the repaired parotid duct. He was discharged from the oral surgery service on August 4, 1955, with an excellent surgical result (Fig. 3).

COMMENTS—This case was most interesting from both a diagnostic and surgical aspect. It is obvious from the history that the differential diagnosis was a problem since a definitive diagnosis was not made until two weeks after the initial injury. The tentative diagnosis became a definitive one with the aid of a sialogram. The importance of the sialogram as a diagnostic aid in such instances cannot be overemphasized.

The surgical management presented a challenge since little information was available on the surgical repair of parotid duct injuries. Polyethylene catheters have been used successfully in other surgical procedures, and a modification of technic was devised for the repair of the severed parotid duct.

SUMMARY—A 29 year old Negro man was admitted to the oral surgery service at Jackson Memorial Hospital, Miami, with the diagnosis of a severed left parotid duct. The injury occurred as a result of a fight in which the patient had received a razor laceration on the left side of the face. A pooling of parotid secretions accumulated in the left cheek causing pain and considerable swelling.

The severed duct was approached through an extraoral incision. A polyethylene catheter was passed through both segments of the duct extending from the parotid gland to the intraoral orifice. The duct was approximated over the catheter with no. 34 gauge stainless steel wire sutures. The catheter was removed the second postoperative week and the duct remained patent and functional.

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Rest position fixation in treatment of mandibular fractures: *report of cases*

■ *Stanley Jakubs,* D.D.S., Patuxent River, Md.*

A method will be described in which a freeway space maintainer is employed during the period of fixation in the treatment of mandibular fractures. This maintainer keeps the mandible in a rest position and the muscles of mastication and deglutition in equilibrium.[1] Such an appliance was used with success at the U. S. Naval Station Hospital, Naples, Italy. It enhanced the patient's comfort, promoted feeding ease in all instances, did not disrupt apposition of the fragments, reduced postfixation trismus, helped to retain good gingival tone and to maintain a good postfixation occlusion. In the trial instances in which it was used, the patients suffered no discomfort. One patient for the first time experienced complete relief from a temporomandibular joint discomfort. This early success induced a follow-up and subsequent instances in which it was used will be described herein. No attempt will be made to discuss methods of fixation, because any type can be used with the freeway space maintainer.

Centric occlusion denotes the relation of the maxillary and mandibular arches when the teeth are in maximal interdigital contact. It is also the position assumed during intermaxillary fixation when mandibular fractures are reduced without taking into consideration the rest position. This, however, is not centric relation; such relation of the mandible to the maxilla denotes the most retruded position of the condyles in the glenoid fossae from which lateral excursions are made. The normal rest position of the mandible is an intermaxillary relation without tooth contact at a level in which the muscles of mastication and deglutition are in a state of equilibrium. This is the physiologic rest position and is recognized as the freeway space.[1] Although this space cannot be measured accurately, many investigators have agreed that

this distance usually is from 2 to 3 mm.[1,2]

Centric occlusion may be established by bringing teeth into contact, but, because of the occlusal inclinations of the teeth, this position may be strained and the condyles may not be in proper relation. This, then, may lead to temporomandibular joint pain and ensuing difficulties. A simple test which shows to some degree the discomfort that fracture patients experience is to close the teeth voluntarily into centric occlusion and hold or maintain this relation for about five minutes or even less—strain can easily be noticed. Also, if deglutition is attempted while teeth are in centric occlusion, it will be found to be more difficult and strained than if started when the mandible is in normal rest position. In addition, deep overbites contribute considerably toward difficult ingestion of even a liquid diet during the period of fixation, especially so when there is a full complement of teeth. Further, tooth to tooth fixation in centric occlusion, especially if some malocclusion existed prior to injury, may lead to a temporomandibular joint tension when the mandible is held continuously in such an unnatural position.[3,4] The presence of "plunger" cusps could also contribute to a fibrous union. Periodontal conditions, due either to malocclusion, difficulty in maintaining good oral hygiene while the jaw is immobilized, cessation of periodontal stimulation, or, conversely, to overstimulation because of the proprioceptive stimulation of occlusal contact, may complicate the period of convalescence.

It was with these thoughts in mind, and because of a desire to improve patient comfort that the freeway space maintainer was conceived. In the interests of a clearer discussion, irrelevant material will be omitted from these reports.

CASE 1—On October 10, 1956, a patient was admitted with a diagnosis of simple bilateral fracture of the body of the mandible with no nerve or blood vessel involvement. Intraoral appliances were present and the teeth apparently were in centric occlusion although the fixation was not too secure. At the time of admittance the gingival tone was noticeably poor and the patient complained of difficulty in taking his liquid diet. He also complained of a transient intermittent pain in the region of the right ear.

TREATMENT AND COURSE—On October 14, all intraoral appliances were removed, maxillary and mandibular impressions were secured and an oral prophylaxis was given. On October 16, the teeth in the existing fracture lines were removed and continuous wire loops made of no. 020 stainless steel ligature wire were applied to the remaining teeth. A previously prepared freeway space maintainer was interposed between the mandibular and maxillary teeth, and intermaxillary elastic traction was utilized to maintain this relation. Two days after such fixation was established the patient had no more complaints about the tenseness and discomfort of the right temporomandibular joint, feeding was accomplished with ease and the gingival tone remained good. Convalescence was uneventful except that on November 5 when, after the intermaxillary elastic traction was removed, mobility of the fracture site on the right side was noticed. Fixation was reestablished and maintained under the same conditions for another seven days, at which time both fracture sites were clinically firm. All appliances were removed and the patient was observed for another seven days prior to discharge to duty.

The patient offered no complaints during treatment. He was comfortable, the gingival tone was improved, feeding was facilitated, and the postfixation occlusion was good and required only a minimal equilibration.

CASE 2—On February 7, 1957, a patient was admitted with a diagnosis of compound fracture of the mandible in the left angle and right mental area. There was moderate involvement of the right mandibular nerve.

TREATMENT AND COURSE—The usual preliminary work-up was completed and on February 9 the patient was sent to surgery where a closed reduction was carried out. Maxillary and mandibular Erich arch bars were applied and again, a freeway space maintainer was inserted prior to firm fixation.

Convalescence was uneventful, the patient remained comfortable and offered no complaints. Routine postoperative care was provided and on March 13 all of the appliances were removed. Occlusion was good, there was a minimum of postfixation trismus, and good clinical union was evident. Feeding again was accomplished with ease.

CASE 4—On November 22, 1957, this patient was admitted with a diagnosis of simple fracture of the mandible in the left angle and left mental area. There was a concurrent laceration of the left cheek but there was no nerve involvement.

TREATMENT AND COURSE—On November 26, after the usual routine work-up, a closed reduction was done and the facial lacerations repaired. As with the other patients, a previously prepared freeway space maintainer was interposed between the arches prior to final firm fixation on maxillary and mandibular Erich arch bars with elastic traction. Again the postoperative course was uneventful; routine postoperative care was provided daily. On January 2, 1958, the appliances were removed, the mandible was clinically firm and the teeth were in good occlusion. The gingival tone was good, there was neligible postfixation trismus, and there was no complaint from the patient during treatment. Feeding was no problem at all.

DISCUSSION—In most instances, during treatment of fractures of the mandible, impressions of both arches are secured for purposes of studying the occlusion and contouring arch bars. Construction of the freeway space maintainer does not require a great deal of additional preparation—all that is needed is a duplicate mandibular model in investment on which the metal casting is made. This, then, is placed on the original stone model, the initial maxillary and mandibular models are next mounted on any type of articulator. The articulator is opened to the predetermined rest position, and a mix of quick setting acrylic resin is interposed bilaterally. This is placed on the laboratory bench and allowed to set for 20 to 30 minutes after which it is removed and finished in the usual manner. The reason for inclusion of any type of simple clasps is to maintain retention in the event the patient should, for any reason, disrupt the integrity of the intermaxillary fixation. My original attempt, prior to Case 1, included the use of such an appliance but with no metal framework. This proved unsatisfactory as far as retention was concerned and had to be modified. Description of this case was not included in this series because the original acrylic space maintainer was inadvertently destroyed by one of our employees; it was just as successful as those reported and illustrated.

Many instances of mandibular fractures are accompanied by edema, trismus, and malocclusion with associated pain on movement. For these reasons, in all of the cases reported, the freeway space was estimated except in the first instance. This patient came in with appliances in place, therefore a reasonable measurement was possible. In the estimated cases an average norm of 2.5 mm. was established to put the musculature at rest. For measurement of the rest position in the single instance the following procedure was used: An indelible pencil dot was placed on the tip of the nose and on the point of the chin in the midline. Then, with the teeth in occlusion, the distance between these two dots was measured and recorded. The patient was next asked to wet his lips and to say the word "lame" and to hold all movement as soon as his lips were in contact and the sound was on the last syllable. This distance was then measured and recorded—the difference between the two measurements was accepted to be the rest position of the mandible, the freeway space, and the point at which the muscles of mastication and deglutition were at rest or in equilibrium.

In this trial series the prosthetic dental officer used a face-bow transfer to a Hanau articulator. This step in all probability is not important since it is necessary only to maintain a certain vertical distance that tends to keep the musculature in a state of equilibrium and the mandible at rest.

Summing up, the steps involved in the construction of the freeway space maintainer are as follows:

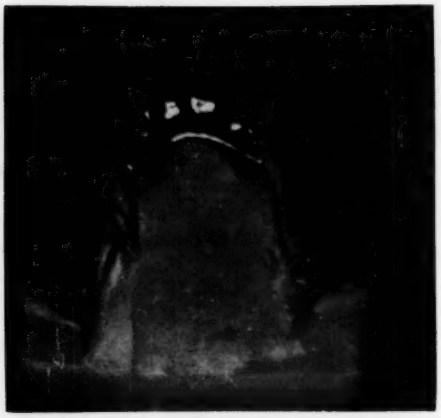

Fig. 1—Lingual aspect of one appliance. Note repositioned left mandibular quadrant

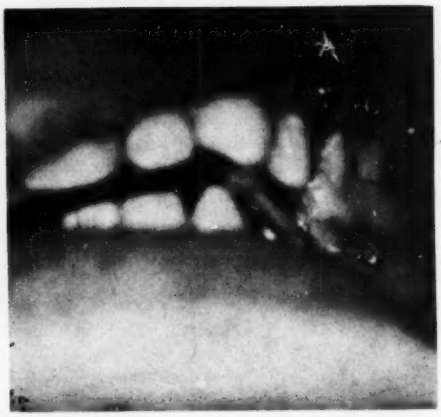

Fig. 3—Appliance in position in the mouth prior to application of intermaxillary fixation

1. Maxillary and mandibular impressions are secured, the cast is cut if necessary and normal occlusion is restored (Fig. 1).

2. The mandibular model is duplicated in investment.

3. Casts are mounted on any articulator in an occlusion considered normal for that person.

4. Metal casting is completed.

5. The rest position or freeway space is measured or the average minimum space is determined where measurement is not possible.

6. The articulator is opened to the rest position, the metal casting inserted, and quick setting acrylic resin interposed bilaterally, engaging the casting as usual in any partial denture construction (Fig. 2). The casting is finished and polished.

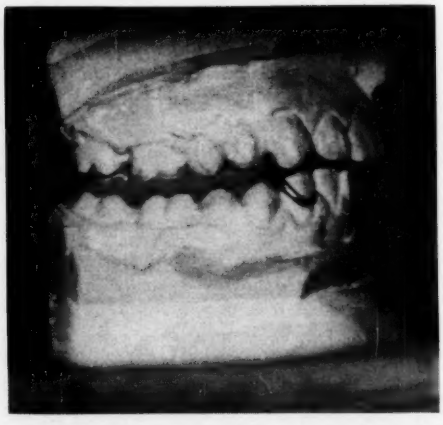

Fig. 2—Freeway space maintainer completed and in position on original model

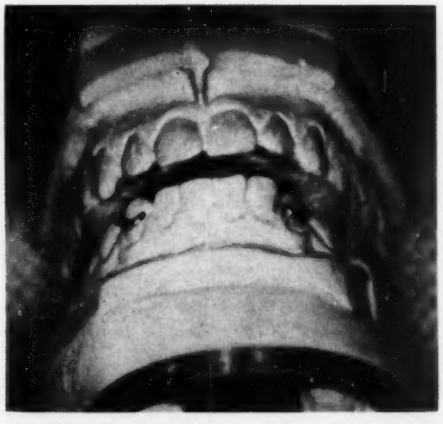

Fig. 4—Added feeding space made available

7. This appliance is inserted prior to instituting intermaxillary elastic traction or other type of fixation (Fig. 3).

In this trial series, Erich arch bars were used in three of the patients and continuous wire loops for the other; there was never any interference with fixation or traction (Fig. 3). The metal castings were made from scrap gold (Fig. 1).

SUMMARY—A new method has been developed for treatment of fractures of the mandible in which the patient is more comfortable, the feeding is facilitated (Fig. 4), and the musculature can rest during convalescence. Four brief case reports are presented in which healing was uneventful and the mandible maintained in good position. The first instance in which the method was used was not included in this series because of the inadvertent loss of the appliance by our laboratory technician. In this instance the method was just as successful except that the bilateral acrylic space maintainer was secured to the mandibular arch bar with fine stainless steel ligature wire to prevent displacement in the event the intermaxillary fixation was interrupted. In each instance the patient remained more comfortable, gingival tone remained good, fixation was firm and positive, there was little to no postfixation trismus, and feeding was greatly enhanced. In Case 1 there was considerable improvement in general comfort including easing of an existing temporomandibular joint tension. In no instance was there interference with the fixation employed.

The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the view of the Navy Department or the naval service at large.

*Captain, Dental Corps, U. S. Navy; dental department, U. S. Navy Station Hospital, Naval Air Station.

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Unilateral hyperplasia of left mandibular condyle and hypoplasia of body of right side of mandible: *report of case*

■ *Richard J. Burch, D.D.S., and Thomas S. Shuttee, D.D.S., San Antonio, Texas*

Normal mandibular development depends on the uninterrupted undisturbed activity of various growth centers. According to Sarnat and Greeley,[1] mandibular growth is of two types—appositional and epiphysial-like growth—the former occurring at the posterior border of the ramus, the alveolar margins, the coronoid tip and the sigmoid notch, and the latter occurring at the condyle. Any interference with these centers such as that caused by trauma, radiation or infection will result in mandibular deformity.

Because of the impossibility of obtaining an adequate and complete history, the exact etiology of the conditions described in this article is questionable. It is known, however, that at the age of three the patient sustained a fracture or fractures of the mandible, but the exact location and the treatment rendered are unknown. It may be assumed that one or more

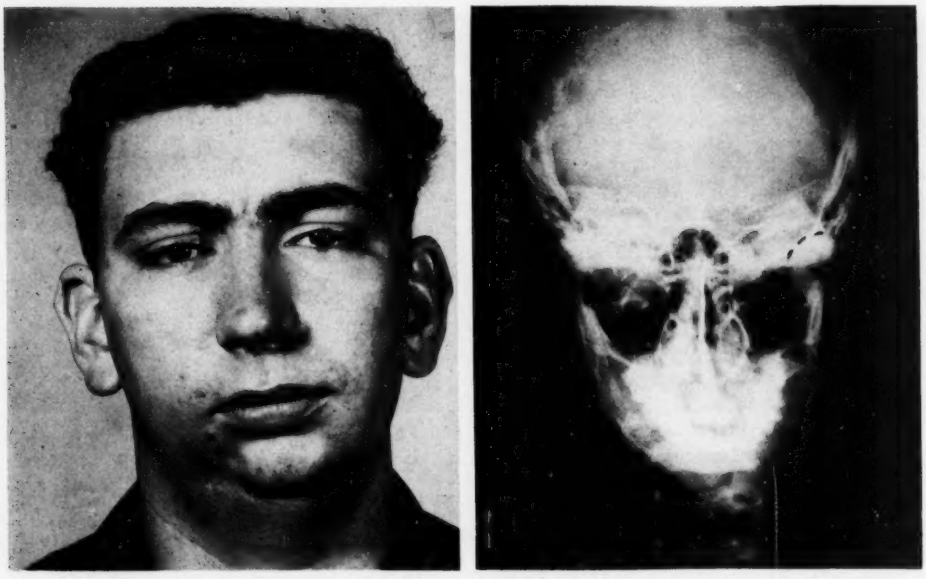

Fig. 1—Left: Preoperative view showing underdevelopment of right side of mandible. Right: Enlargement of condyle on left and underdevelopment of mandible on right

of the growth centers described were traumatized.

REPORT OF CASE—On June 17, 1957, a 21 year old man was admitted to the oral surgery service of the USAF Hospital, Lackland Air Force Base, Texas, as a transfer case. The patient complained particularly of a progressive inability to open his jaws and a deformity of the right side of the mandible.

The patient stated that he had first become cognizant of an inability to open his mouth to a normal degree approximately 24 months prior to admission but, inasmuch as no pain had been associated with the difficulty, he failed to seek treatment. The ankylosis had progressed steadily.

The past history was meager. The patient had been involved in a car accident at three years of age, at which time he sustained a fracture or fractures of the mandible. Additional information concerning his injuries was unobtainable from relatives or physicians.

Admission examination revealed the patient to be well developed and well nourished; however, even with extreme effort he could not open his teeth more than 3 mm. Lateral jaw excursions were impossible; occlusion of the teeth was good. There was also noticeable asymmetry of the face resulting from underdevelopment of the body of the right side of the mandible (Fig. 1, left). The remainder of the physical examination was negative and noncontributory.

Laboratory examination findings were within normal limits with the exception of the blood chemistry which showed an elevation of serum alkaline phosphatase of 11 Bodansky units. Roentgenographic examination revealed that the left mandibular condyle was considerably enlarged and that there was little or no motion present in the joint (Fig. 1, right). The right mandibular condyle appeared normal. The body of the left side of the mandible showed underdevelopment. The remainder of the roentgenographic examination was negative.

The patient was placed on routine hospital care and supportive treatment during his physical evaluation and workup. On July 9 a moulage of the patient's face was made to aid in treatment planning.

After oral surgery staff consultation, the treatment plan elected was to consist of two separate operations: first, a left condylectomy and second, an autogenous bone graft to the body of the right side of the mandible.

On July 26 the condylectomy was performed. A 16 cm. incision (as in a parotid excision) was made from the temporal region extending downward to the tragus of the left ear and paralleling inferiorily just below the inferior border of the mandible. The underlying tissues were divided by sharp and blunt dissection to expose the ascending ramus and condyle. A no. 8 round bur in a dental engine was used to detach the condyle from the mandible. Because of the size of the condyle (three times that of normal), complete separation of its attachments to the mandible capsule and delivery could not be made through the submandibular approach. Separation of the fibroid attachments of the condyle was completed through the preauricular flap. Using a sharp curet, the condyle was freed, removed inferiorly, and forwarded to the pathology section. The wound was then closed in layers, the periosteum with no. 000 chromic gut, the deep muscle layers and subcutaneous tissues with no. 000 plain gut, and the skin with no. 00000 black silk continuous sutures.

Healing progressed uneventfully, and by August 7 the patient could open his mouth 4 cm. Left lateral excursions of the mandible were good but right lateral excursions were limited because of loss of the left external pterygoid attachment. The pathologist's diagnosis was as follows: "Bone essentially normal. Sections taken through the bony tissue show relatively cortical bone and bits of red marrow. In some areas fibrohyalin cartilage is observed. There are a few spicules of bony tissue within this cartilagenous material. No pertinent pathological features were observed microscopically."

In preparation for the second surgical procedure, the moulage of the patient's face was studied to determine the region of the mandible

Fig. 2—Postoperative view of sites of left condylectomy and right iliac graft, July 1958

Fig. 3—Patient after bone grafting

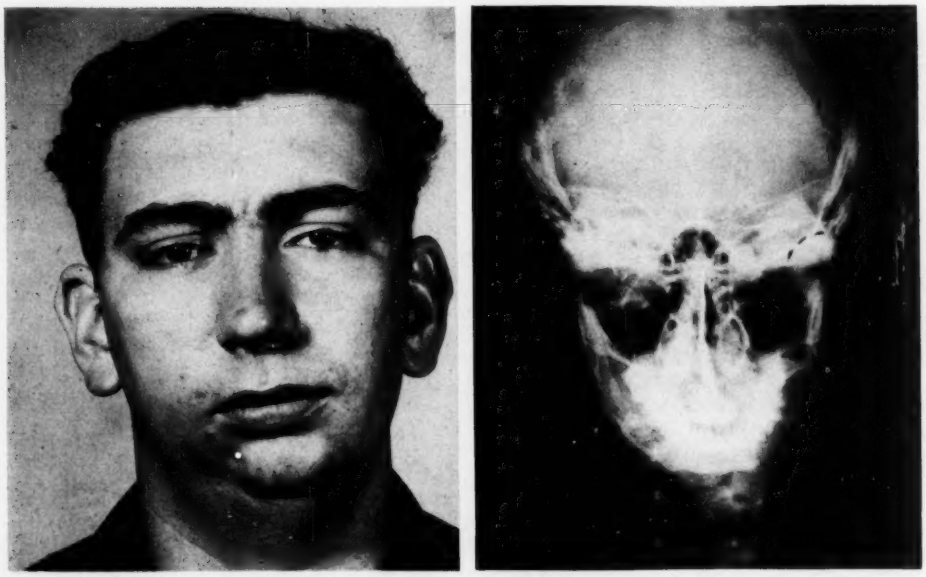

Fig. 1—Left: Preoperative view showing underdevelopment of right side of mandible. Right: Enlargement of condyle on left and underdevelopment of mandible on right

of the growth centers described were traumatized.

REPORT OF CASE—On June 17, 1957, a 21 year old man was admitted to the oral surgery service of the USAF Hospital, Lackland Air Force Base, Texas, as a transfer case. The patient complained particularly of a progressive inability to open his jaws and a deformity of the right side of the mandible.

The patient stated that he had first become cognizant of an inability to open his mouth to a normal degree approximately 24 months prior to admission but, inasmuch as no pain had been associated with the difficulty, he failed to seek treatment. The ankylosis had progressed steadily.

The past history was meager. The patient had been involved in a car accident at three years of age, at which time he sustained a fracture or fractures of the mandible. Additional information concerning his injuries was unobtainable from relatives or physicians.

Admission examination revealed the patient to be well developed and well nourished; however, even with extreme effort he could not open his teeth more than 3 mm. Lateral jaw excursions were impossible; occlusion of the teeth was good. There was also noticeable asymmetry of the face resulting from underdevelopment of the body of the right side of the mandible (Fig. 1, left). The remainder of the physical examination was negative and noncontributory.

Laboratory examination findings were within normal limits with the exception of the blood chemistry which showed an elevation of serum alkaline phosphatase of 11 Bodansky units. Roentgenographic examination revealed that the left mandibular condyle was considerably enlarged and that there was little or no motion present in the joint (Fig. 1, right). The right mandibular condyle appeared normal. The body of the left side of the mandible showed underdevelopment. The remainder of the roentgenographic examination was negative.

The patient was placed on routine hospital care and supportive treatment during his physical evaluation and workup. On July 9 a moulage of the patient's face was made to aid in treatment planning.

After oral surgery staff consultation, the treatment plan elected was to consist of two separate operations: first, a left condylectomy and second, an autogenous bone graft to the body of the right side of the mandible.

On July 26 the condylectomy was performed. A 16 cm. incision (as in a parotid excision) was made from the temporal region extending downward to the tragus of the left ear and paralleling inferiorily just below the inferior border of the mandible. The underlying tissues were divided by sharp and blunt dissection to expose the ascending ramus and condyle. A no. 8 round bur in a dental engine was used to detach the condyle from the mandible. Because of the size of the condyle (three times that of normal), complete separation of its attachments to the mandible capsule and delivery could not be made through the submandibular approach. Separation of the fibroid attachments of the condyle was completed through the preauricular flap. Using a sharp curet, the condyle was freed, removed inferiorly, and forwarded to the pathology section. The wound was then closed in layers, the periosteum with no. 000 chromic gut, the deep muscle layers and subcutaneous tissues with no. 000 plain gut, and the skin with no. 00000 black silk continuous sutures.

Healing progressed uneventfully, and by August 7 the patient could open his mouth 4 cm. Left lateral excursions of the mandible were good but right lateral excursions were limited because of loss of the left external pterygoid attachment. The pathologist's diagnosis was as follows: "Bone essentially normal. Sections taken through the bony tissue show relatively cortical bone and bits of red marrow. In some areas fibrohyalin cartilage is observed. There are a few spicules of bony tissue within this cartilagenous material. No pertinent pathological features were observed microscopically."

In preparation for the second surgical procedure, the moulage of the patient's face was studied to determine the region of the mandible

Fig. 2—Postoperative view of sites of left condylectomy and right iliac graft, July 1958

Fig. 3—Patient after bone grafting

to receive the graft and to estimate amount of pelvic bone required. Roentgenograms of the pelvis showed no abnormality.

On October 30, surgery was performed again. Members of the orthopedic service staff obtained a segment of bone, 11.5 cm. long, 2 cm. thick, and 2.5 cm. wide from the left iliac crest. At the conclusion of this procedure the patient was redraped and prepared in the usual manner for an open reduction of the right side of the mandible. A 10 cm. incision was made beginning at the angle of the right side of the mandible and extending approximately 1 cm. below the inferior border of the mandible, terminating at the symphysis. The underlying tissues were divided, exposing the hypoplastic region of the mandible. A mallet and chisel were used for partial decortication of the buccal surface of the mandible. The autogenous bone was then reduced, segmented, shaped and fitted to restore the normal contour of the right side of the mandible. A no. 6 round bur was used to make six holes completely through the graft and mandible, and the inferior border of the mandible was notched opposite the holes. Then 18 gauge stainless steel wire was used to secure the graft in good apposition to the mandible. The wound was closed in the same manner as described in the first surgical procedure.

Healing progressed satisfactorily. Postoperative roentgenograms revealed the graft to be secure and in position (Fig. 2). The patient's profile was greatly improved by the procedure (Fig. 3). He was returned to duty on December 2, 1957. To date there has been no evidence of resolution of the graft or of infection. He is able to open his mouth normally. As a result of exercises, the right lateral movements have greatly improved.

COMMENTS—In a review of the more than 50 cases of unilateral hyperplasia of the mandibular condyle reported in the literature, it was noted that the majority of patients exhibited from moderate to severe malocclusion, deformity of the face due to enlargement of facial bones on the affected side or elongation of the ascending ramus with the chin shifted toward the unaffected side.

In the present instance, the patient appeared, on preliminary examination, to fall into the category of overdevelopment of facial bones on the affected side. However, careful clinical and roentgenographic examination revealed that the bones of the left side of the face exhibited normal development—the only hyperplasia being confined strictly to the left mandibular condyle. As stated, the patient's occlusion was normal and not affected. The asymmetry of the patient's face was due solely to underdevelopment of the body of the right side of the mandible.

SUMMARY—A patient came for treatment of an ankylosis of the left temporomandibular joint. The condition was corrected by the extirpation of an enlarged mandibular condyle, and a unilateral hypoplastic defect of the opposite body of the mandible was corrected by an autogenous bone graft from the iliac crest.

The opinions or assertions contained herein are those of the authors and are not to be construed as official or as reflecting the view of the Department of the Air Force or the Air Service at large.

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■ INDIVIDUALITY

What another would have done as well as you, do not do it. What another would have said as well as you, do not say it. What another would have written as well, do not write it. Be faithful to that which exists nowhere but in yourself—and thus make yourself indispensable.—*Andre Paul Guillaume Gide.*

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EDITORIALS

Animal surgery in residency training

EXPERIMENTAL ANIMAL SURGERY is an increasingly important part of residency training in oral surgery, for it provides the trainee with valuable experience in oral surgery procedures which cannot otherwise be obtained without extensive experience on human beings. Regardless of obvious limitations, a well-equipped, well-integrated animal surgery program has much to offer, for it not only allows continuous participation in major procedures but also introduces the resident to the discipline of research. Proper timing in obtaining this additional training is of considerable importance. It is most effective if utilized after completion of the graduate study of the basic sciences and after some clinical and surgical experience.

Since the resident can also assist in other surgical procedures on animals, it gives him an excellent opportunity to observe surgical technics used in other surgical specialties. As his experience and technical skill increase, he develops rapidly the basic surgical functions of proper handling of tissues, control of hemorrhage, surgical anatomy, surgical technic and preoperative and postoperative care. An additional advantage is the practical application of the basic sciences.

It should be noted that similar programs have been used with great benefit for several years in other surgical specialties. Obtaining an adequate surgical experience in all procedures early in residency training has always been and will continue to be a problem, since patients can be studied only within certain definite limits. The number of patients available for experimentation and study is also steadily diminishing as a result of an improved economic status of the patients and a greater utilization of prepaid hospitalization insurance programs.

Experimental animal surgery has proved a valuable adjunct to the training program in oral surgery. Its more universal utilization should be encouraged since it would add materially to the educational level of oral surgery.—*Donald E. Walker.*

■ LOKAL ANAESTHESIE UND LOKAL ANAESTHETIKA. Edited by Professor H. Killian. 770 pages with 341 illustrations and 42 tables. DM 154. Stuttgart, Georg Thieme Verlag, 1959.

This comprehensive volume on local anesthesia and local anesthetic drugs, edited by Professor Killian and including contributions by 17 recognized authorities on the subject, definitely fills a gap that still existed in the German literature on anesthesia.

The book is divided into five parts, but each individual chapter is followed by an exhaustive bibliography, subdivided into monographs and individual publications, mainly of recent origin.

The introductory chapter consists of an excellent, though brief, review of historical data in the development of local anesthetic drugs and technics and includes a chronologic list of the important vasodepressors. This is followed by a clear description of nerve fibers, their characteristics and their pathways. The different pain qualities including pathological reactions such as hyperalgesia and causalgia as well as the mechanism of pain caused by heat and cold and the phenomenon of itching are included. The response of the organism to pain at the level of the tissue and vessels, the spinal cord, the diencephalon and the cerebral cortex is investigated.

The known facts and theories on pain production and its mechanism, the chemical and physical changes and their effects on action potentials, the role of the electrolytes and of acetylcholine in this respect are discussed, and the phenomenon of pain is traced down to the molecular and enzymatic level.

The next chapter is devoted to the development, chemistry and the physicochemical properties of the local anesthetic drugs and a description of the anesthetic solutions in use with regard to their stability, tonicity, diffusibility, their breakdown and elimination.

The effects of the local anesthetic drugs on smooth and striated muscles, the blood and its influence on pathologic tissue reaction, on metabolic processes and temperature regulating mechanism, are described as well as their respective sympathomimetic or parasympathomimetic actions, especially on the ganglionic level.

"Endoanesthesia" as designated by Zipf means the influence of local anesthetic agents on the "internal sensibility" of organs or receptors which come into contact with the injected agent. This leads to a description of the systemic effects upon heart and general circulation as well as the central nervous system and is followed by a broader discussion on toxicology of these drugs in men as well as in animals.

The following chapter deals with the vasoconstrictors in use as well as with substances that will speed up absorption of the local agents.

Specific and nonspecific complications after the injection of local anesthetics are reflected in an investigation of 106 patients with toxic symptoms, 31 of whom died. Seventy-four per cent of these cases occurred during or after dental anesthesia.

Naturally, a good amount of space is reserved for the description of spinal and epidural anesthesias, their indications, technics, their localized and systemic effects and their complications; paravertebral analgesia and ganglionic blocks in the cervical, thoracic and lumbar areas are likewise included in this chapter.

There follows an excellent chapter on the anatomy and the clinical approach to cranial nerves and their ganglia. The meticulous description of different approaches to the gasserian ganglion indicates that blocking of this structure is still used more often in Germany than elsewhere. However, there are also a number of excellent illustrations for blocks at the level of the trigeminal branches.

Within the extensive part of the book that deals with local anesthesia of the anatomical

regions, there is another chapter dealing with anesthesia of the teeth and jaws which also includes a list of the agents in use. The innervation and blocking technics are well described with the help of 14 figures.

Anesthesia of the head and neck, including blocks for the repair of cleft lip and palate, are to be found in one of the chapters.

For the anesthesiologist, surgeon or dentist who reads German, this book will prove a valuable addition to his library on local anesthetic technics and drugs.—*H. Beyer, M.D., Paul R. Dumke, M.D.*

■ In the Dentist's Office. By G. Archanna Morrison. 280 pages. Second edition. $7.50. Philadelphia, J. B. Lippincott Co., 1959.

Mrs. Morrison has written this book in the same tempo in which she speaks—with sparkle, enthusiasm and authority. She first felt the need for a textbook when she herself was an executive dental assistant in Boston. Later, Mrs. Morrison became an instructor and her teaching experience in a wide range of dental offices has given her an extensive knowledge of the requisites for personal efficiency in a dental office. At present she is a dental lecturer, consultant and dental practice analyst.

"In the Dentist's Office" is easy reading and well arranged for quick reference. In the chapter "Qualifications" are listed the basic qualities for a dental assistant; these include good grooming, enthusiasm, initiative, loyalty, the smile and diplomacy of a hostess, tenderness and understanding of a mother, alertness of a nurse, ability of a housekeeper, good health, patience and fortitude. In the chapter called "Tested Phrases for Personnel," Mrs. Morrison gives examples of words to use when dealing with patients. She tells us to avoid the word "hurt"—use "uncomfortable"; ask the patient to "empty his mouth"; a tooth is preferably "removed"—not "extracted" or "pulled."

In another example it is suggested that a small mirror be placed so that a receptionist may see her reflection as she talks over the telephone. She is thus encouraged to use a happier expression and better enunciation. The mirror is also a morale builder. Since the receptionist must sometimes cope with difficult people over the telephone a mirror showing her reflection will be a help in maintaining confidence in herself. The text is written in a positive manner. The suggestions and information on each specific area are as good as the examples above.

The contributions to the book by six dentists are well done and add value to the book. Each chapter written by these contributors is acceptable to the average high school graduate because the choice of words makes the reading or study easy and understandable. "Helpful Hints" by J. Murray Gavel, is an especially informative chapter and possibly might be used daily for reference.—*Florence Major, R.N.*

■ Disorders of the Temporomandibular Joint. Edited by Gustav O. Kruger, A.M., D.D.S. 573 pages with 489 illustrations. $12.75. St. Louis, C. V. Mosby Co., 1959.

In assembling and editing this book Dr. Kruger has drawn heavily upon contributors who are preeminent in the fields in which they write. In the preface Dr. Kruger states, "The contributors have been selected because of their competence in the field. Each has devoted his efforts to one chapter. It is to them that any credit for this work is due."

All of the 20 chapters are well written. The order of the subject matter is logical, straightforward and devoid of excess verbiage. The illustrations are well selected and add clarity to the text. The book is printed on excellent paper and well bound.

With the exception of exodontics, the entire field of oral surgery as carried out in the modern practice of this specialty is dealt with from both fundamental aspects and clinical practice. The exception of exodontics is probably quite proper in a book of this kind. The author states, "In most schools exodontia is taught as a separate course in the third year, and there are several books on this subject." For those schools which present the subject of oral surgery in this way, Dr. Kruger's book should be an excellent text. It seems that this

book is well designed to meet the needs of the graduate student in oral surgery, and also those practitioners who feel competent to deal with most of the problems of exodontics but who would like authoritative and detailed information concerning other phases of oral surgery.—*Warren R. Schram.*

■ PROCEEDINGS OF THE WORKSHOP ON DENTISTRY FOR THE HANDICAPPED. Edited by Manuel M. Album. 121 pages with 8 pages of illustrations. $5. Philadelphia, The University of Pennsylvania, 1958.

The workshop on dentistry for the handicapped was held with the object of assembling leaders in the field of dentistry for the handicapped for an exchange of knowledge and for discussion of mutual problems. This book is the result of that workshop.

The text of all lectures delivered at the workshop is presented as well as a summation of the discussion seminars which followed the lectures.

The classification and medical description of various handicapping conditions are discussed. The methods of inducing anesthesia as well as the most logical approach to the dental problem for the various types of handicaps are well presented.

The book offers the most modern approach to solving the dental problems of handicapped persons available today. It is to be recommended to anyone who is now offering or is planning to offer dental treatment to handicapped persons.—*William F. Via, Jr.*

■ ORAL DIAGNOSIS. By Donald A. Kerr, D.D.S., M.S., Major M. Ash, Jr., D.D.S., M.S., and H. Dean Millard, D.D.S., M.S. 419 pages with 212 illustrations. Index. $10. St. Louis, The C. V. Mosby Co., 1959.

This new book provides a method of approach to the diagnosis of disease. Although the book is primarily concerned with the principles of diagnosis common to all phases of dentistry, it is also concerned with the actual procedures.

The authors in their preface state: "This is not a reference book of signs and symptoms of oral disease. The principles of oral diagnosis as set forth, provide the fundamentals for the selective use of reference material that may be found in textbooks of oral pathology, oral medicine and radiography."

The objectives of this book are to: (1) present an outline for the systematic collection of subjective information alluding to the cardinal manifestations of disease; (2) give the actual procedure for determining the presence of cardinal manifestations of disease; (3) show by illustrative cases how to make a differential diagnosis, and (4) show how a clinical history, examination and diagnosis are utilized in the practice of dentistry.

The authors have been successful in consolidating their contributions into a coherent scheme. The text is well edited, reflecting a very carefully organized cooperative effort. This is a worthwhile textbook, and not merely a haphazard collection of individual items.

The book is well printed on an excellent quality of paper, in an easily readable type. References are found at the end of each chapter, and there is a good subject index. Generous use of illustrations, roentgenographic reproductions and charts add to the utility of this volume. The text fills a long-felt need and cannot be too highly recommended to teachers, practitioners and students.—*E. Alan Lieban.*

■ PRACTICAL ORAL SURGERY. By Henry B. Clark, Jr., M.D., D.D.S. Second edition. 469 pages with 509 illustrations. Index. $9.50. Philadelphia, Lea & Febiger, 1959.

The second edition of this book retains both the freshness and usefulness of the first edition by its adherence to concise and factual presentation of the textual material.

Basically this edition's layout is the same as the first, again utilizing 16 chapters with the same sequence and titles. However, the use of heavy type for major subjects, a boxed outline of the salient features of many chapters, and a detailed table of contents are new features which increase the readability of this edition.

Other notable changes include enlargement of the chapters on oral surgical technics, infections, injuries, and deformities, with appropriate additional illustrations. More attention also is given to the subject of biopsies and the "why" and "how" of performing them.

The most recent developments in the drug field and how their use influences the practice of oral surgery are explicitly discussed. Among the more common drug problems reviewed are antibiotic premedication for patients with valvular heart disease, the use of epinephrine in local anesthetics with cardiac patients, and the proper management of patients receiving such potent drugs as ACTH, cortisone and Dicumarol.

Finally, subcondylar vertical osteotomy as a means for correction of mandibular prognathism is described and illustrated as a new attraction of this edition.

There are about 200 new clinical photographs and line drawings that are of the same excellent quality as those in the first edition. The bibliography is adequate and the cross references help tie related subjects together.

Although there are several typographical errors in the text, these pale into insignificance when the teaching value of this book for dental students, general practitioners, and graduate students is considered. This book is certainly an important basic text for any dental library, but in spite of the improvements in the second edition it is debatable whether an owner of the first edition would find it beneficial to purchase the second.—*Richard C. Baumbach.*

■ TRANSPLANTATION OF TISSUES: VOLUME II. Edited by Lyndon A. Peer, M.D. 690 pages with illustrations. Index. $20. Baltimore, Williams & Wilkins Co., 1959.

Thirteen authors have collaborated to produce a highly detailed and authoritative text covering the philosophy and the experimental and clinical data pertaining to the free transplantation of tissues. The tissues discussed in various chapters include teeth, cornea, skin, peritoneum, fat, nerves, blood vessels, endocrine glands, organs, and tumors. In each instance the degree of success to be anticipated from a free transplant is discussed objectively and summarized from a massive collection of experimental and clinical findings.

The book begins logically with a most thorough discussion of the biological basis for the transplantation of tissues. The value of the fundamental knowledge reviewed therein is appreciated as progress is made through subsequent chapters.

Free autogenous transplants seem to be well tolerated with but few exceptions where function is limited or the basic tissue is replaced by a less highly differentiated tissue. Necrosis is an uncommon sequel to an autogenous transplant properly conceived and executed.

In certain instances free homogenous transplants are highly successful, the most notable of these being blood and blood vessels, bone, cartilage, and cornea. The success of transplantation of other homogenous tissues is sharply limited by the apparent immune response they evoke from the host, leading to eventual necrosis. Attempts to modify the immune response have been largely unsuccessful. This, then, is perhaps the largest single problem waiting to be solved. Answers may be found through newer technics now available in the field of tissue culture.

Most chapters include a summary which will provide the more casual reader with a worthwhile review of recent advances in the dynamic field of tissue transplantation. Profuse references accompany every chapter adding greatly to the value and impact of the text.—*Edward P. Henefer.*

■ THE RESUSCITATION PROBLEM. Hamilton Southworth, M.D. Circulation 20:946 Nov. 1959.

Surgical procedures under modern anesthesia provide a not inconsiderable incidence of cardiac arrest. Large hospital series suggest that arrest may occur as often as once in every 2,000 anesthesias administered and that therefore there may be 5,000 instances each year. The rising incidence up to 1952 seems attributable to the increase both in the complexity and the daring of surgery and in the multiplicity of anesthetic agents and associated medication. Basically, however, the precipitating factors in the susceptible individual are generally a combination of hypoxia and vagal stimulation.

The treatment of cardiac arrest is divided into two steps: (1) to re-establish pulmonary ventilation, preferably by intubation and manual breathing, using a bag and 100 per cent oxygen, and (2) to open the chest and re-establish the blood circulation by cardiac massage. If fibrillation is present or appears during massage, defibrillation is best carried out by electric shock across the ventricles until the fibrillation is broken. Intracardiac injection of drugs usually is of secondary value. Administration of epinephrine (3 to 5 ml. of a 1:10,000 solution) strengthens ventricular contraction and may help to initiate spontaneous contraction when the heart is at a standstill. In ventricular fibrillation it is useless by itself as it increases the tendency to fibrillation. Procaine (3 to 5 ml. of a 1 per cent solution) injected into the right ventricle is indicated in the attempt to terminate ventricular fibrillation if electrical shock seems ineffective. In the operating room for such an emergency, sterile technic is not attempted. While the anesthetist establishes the airway and begins ventilation with oxygen the surgeon quickly opens the chest, usually by an incision between the fourth and fifth ribs on the left. If the heart is truly in arrest there will be no bleeding on incision. After massage is initiated a rib spreader is introduced and proper surgical closure is not carried out until both heart beat and respirations have proved their ability to continue spontaneously.

When confronted with an apparent case of sudden exitus not in the operating room, the first duty of the physician is to confirm that cardiac arrest really has occurred. This is accomplished best by deep palpation of the abdomen for aortic pulsations. Time should not be wasted listening for more than a moment for heart sounds or applying a blood pressure cuff but it is most important that syncope and that repetitious attacks of the Stokes-Adams type be differentiated. Next, the physician should glance rapidly at his watch and record the time. If he feels there is any chance this may be one of the rare medical instances where cardiac resuscitation is indicated he then should call for trained assistance, for it is obvious that one person cannot massage a patient's heart and breathe for him at the same time. At least two trained persons must be present from the very start.

To help the doctor confronted with an instance of cardiac arrest outside the operating room, and to decide whether or not to attempt cardiac massage, the following three questions have been proposed: (1) Has the patient the fundamental health to justify restoration of life? Obviously one would not wish to resuscitate a patient who has a hopeless prognosis; (2) is it reasonably certain that there is still time to institute massage and that the critical time limit (4 minutes) during which full restoration is still possible has not passed? and (3) has the physician the training, the equipment and the assistance necessary to undertake both cardiac massage and assisted respiration and to carry them through to a successful conclusion? Here the first emphasis is on the need for at least two people who are reasonably

trained. The initial equipment need be only a scalpel, for the person assisting in the breathing can start with mouth-to-mouth respiration. But proper rebreathing apparatus must be available by the time the chest has been opened, and eventually a skilled surgical closure in the operating room is needed. Once massage is under way, and especially if there is resumption of effective cardiac action, there will be brisk bleeding. It is therefore inadvisable to attempt cardiac massage, except under extraordinary circumstances in a patient's home or in the doctor's office, outside a hospital.

Because the occasional case may justify cardiac massage, it is recommended that each practitioner think through the problems of cardiorespiratory resuscitation and decide what criteria he believes must first be met. It is also recommended that he be trained in the simple methods of assisted respiration, and if possible also have the experience of successfully massaging a dog heart back from standstill.

In this way he may be able to help carry through a successful resuscitation if a case with the proper indications ever comes his way.—*Myron Kaufman.*

■ Effect of Quinidine and Tranquilising Agents on Ectopic Ventricular Tachycardia. R. B. Asora, M.D., and P. L. Sharma, M.D. Lancet, No. 7080:962 May 1959.

In dogs two-stage ligation of the anterior descending branch of the left coronary artery produces a long-lasting (72 to 96 hour) ventricular tachycardia. This arrhythmia corresponds in many ways to that seen in patients with acute myocardial infarction.

In the authors' experiments quinidine and tranquilizing agents have been tested for their ability to suppress ventricular ectopic beats in dogs. The individual dosages of these drugs were less than their toxic dosages. No untoward side effects were noticeable in the unanesthetized dog.

On the basis of the experimental data it is suggested that such mixtures may be of use in treatment of arrhythmias which follow myocardial infarction in man.—*Martin F. Anderson.*

■ Catgut, Silk, and Silver—The Story of Surgical Sutures. Ira S. Goldenberg, M.D. Surgery 46:908 Nov. 1959.

The search for the perfect surgical suture material has been a long and laborious one and is not yet ended. The ideal material would be a perfect union of easy sterilization, adequate tensile strength, handling ease, absence of foreign body reaction, and complete tissue absorption. Such a suture has yet to be developed. Much has been accomplished, nonetheless, and the sutures so much taken for granted in modern surgery are the result of trials and disappointments of a long succession of physicians.

The first reference to the use of surgical suture material was 4,000 years ago in Egyptian literature, where approximation with linen adhesive plaster and sutures of the same material were mentioned. In 1,000 B.C. in India, the use of ants as suture material was reported. This utilized the jaw of the head of the ant for closure. In recent years this has also been reported in South America. The first description for ligation of blood vessels was in Rome during the first century A.D. Galen refers to catgut in 175 A.D. In the fifteenth century the importance of isolated rather than en masse ligature of tissue was recognized. Wire sutures fashioned of gold were introduced in the sixteenth century. Luigi Porta in 1840 demonstrated catgut to be the most homogeneous and strongest substance for a suture material and its use became widespread.

In 1869 Joseph Lister introduced suture sterilization. He discovered that chromic acid impregnation of catgut delayed its absorption and this method is still employed by many manufacturers today. J. M. Sims in 1857 introduced silver wire as a suture material. Theodor Kocher in the 1880's began to advocate silk for wound closure. William Halsted visited him at that time and returned to America to begin using silk routinely in his operations.

In 1891 Halsted published the first of a series of reports on his surgical technic and

instrumentation. This was the beginning of a surgical era which promulgated careful technic in the use of silk sutures. Sepsis in catgut-sutured wounds remained a problem because of difficulty in catgut sterilization. Today heat methods are used for suture sterilization and in addition irradiation methods with electron beams have become prominent. Other materials have been proposed for suture use in recent decades—steel wire, umbilical cords, canine nerves, kangaroo tendon, cotton, fascia, and synthetic plastics. Tissue toleration with the last-named is maximal and tensile strength is excellent.—*Myron Kaufman.*

■ ANKYLOGLOSSIA. M. Tuerk, M.D., D.D.S., and E. C. Lubit, D.D.S. Plast. & Reconstr. Surg. 24:271 Sept. 1959.

Ankyloglossia, or tongue-tie, is not an uncommon finding at birth, manifested by an abnormal attachment of the lingual frenum which binds the tongue to the floor of the mouth. This condition may have effects on speech, dental occlusion, growth and facial form.

The tongue, unconfined by teeth, extends outward between the gums. With the eruption of teeth, the tongue is confined. The tongue influences dental arch development. When an infant swallows, the tongue is between the jaws. The adult swallow starts at two and one half years. Children who swallow in the atypical manner find it difficult to swallow with the teeth together, and have difficulty in pronouncing their sibilants. These children exhibit an open bite malocclusion. Ankyloglossia, by binding the tongue anteriorly, can be an important factor in the production and perpetuation of an open bite malocclusion. Abnormal tongue swallowing produces jaw malformations due to bone's inherent plasticity, and thereby, facial deformities are produced.

Ankyloglossia arises from a thickening of the genioglossus musculature. The midline is elevated into a distinct vertical fold covered by mucous membrane and called the frenum linguae. This unites the tongue to the floor of the mouth. It is difficult at birth to determine how much frenum interferes with movement. If the tongue is truly ankylosed, two dental deformations take place. Inability to raise the tongue may prevent the adult swallow and result in open bite, and tongue thrusting may produce mandibular prognathism. It is desirable to correct ankyloglossia early.

Ankyloglossia surgery has consisted of merely snipping the lingual frenum. Mucous membrane binding of the anterior or free portion of the tongue often may be associated with a foreshortening of the genioglossus musculature. Therefore, an incomplete operation often will not suffice to correct this condition. Simple frenulotomy may produce future scar contracture with greater deformity. When frenulotomy is indicated, it should be done in conjunction with a Z-plasty of the sublingual mucous membrane to prevent future contractures. When tongue-tie is present in older children it is advisable to perform a more extensive procedure. —*Donald B. Rae.*

■ COMPARISON OF THE RECOVERY FROM METHOHEXITAL AND THIOPENTAL ANESTHESIA IN MAN. Lawrence Egbert, M.D.; Stephen Oech, M.D., and James Eckenhoff, M.D. Surg., Gynec. & Obst. 109:427 Oct. 1959.

A complex reaction timer obtained from the American Automobile Association was used to evaluate the recovery from Methohexital and thiopental anesthesia. This instrument estimates quantitatively the ability of a subject to perform the tasks of driving a car by recording in milliseconds the time required to turn a wheel or apply the brake after an appropriate signal. It is sensitive to changes and mood and ability to concentrate. Fourteen healthy subjects were studied under both intravenous thiopental sodium and intravenous Methohexital anesthesia. A 1 per cent solution of Methohexital and a 2.5 per cent solution of thiopental sodium were used with 1 ml. of solution given every five seconds until the subject ceased counting. Analysis was made of the differences between subjects in duration of unconsciousness, the time necessary to recover sufficiently to "drive" normally, and the incidence of side effects.

The data obtained indicates that Methohexital is about two and one half times as potent as thiopental sodium with a comparative duration of effect approximately two thirds as long. Methohexital probably is detoxified more rapidly than thiopental sodium. Motor disturbances are more likely to occur with Methohexital. In a double blind study, Eckenhoff and Norton found a 14.4 per cent incidence of muscular movement and tremors associated with Methohexital anesthesia as compared to 6.0 per cent incidence with thiopental sodium. The occurrence of hypotension following both intravenous anesthetics deserves emphasis. Early ambulation during recovery should be with caution.—*Irwin A. Small.*

■ TUMORS OF THE INTRAORAL ACCESSORY SALIVARY GLANDS. Frank Velios, M.D., and William Shafer, D.D.S. Surg., Gynec. & Obst. 108:450 April 1959.

Epithelial neoplasms of the oral cavity arise not only in the squamous epithelium but also in the associated accessory glands. These latter tumors differ from the neoplasms derived from the squamous epithelium both from their morphologic aspects and their biologic potentialities. Separation of this group of neoplasms from others arising in the oral cavity is important.

There were 54 tumors in this series, 25 benign, 27 malignant, and 2 unclassified. Twenty-one of the 25 benign tumors were characteristic pleomorphic adenomas, "mixed tumors" and another tumor was similar, but, because it was composed only of spindle-shaped cells, it was classified as a myoepithelioma. The other three benign tumors were papillary. The 27 malignant tumors included 15 mucoepidermoid carcinomas, 8 cylindromatous adenocarcinomas, 2 mucous cell adenocarcinomas, and 1 each of papillary cystadenocarcinoma and poorly differentiated adenocarcinoma.

The pleomorphic adenoma or mixed tumor was characteristically encapsulated. The histologic appearance of these tumors included tubes or ducts lined by small, uniform, cuboidal cells. The stroma is often myxomatous or cartilage-like in tumors of major salivary glands, but in the examples encountered in the oral cavity in this series, more frequently is composed of hyalinized connective tissue.

Three tumors fell into the category of benign papillary tumors although they differ from each other. The first, an intraductopapilloma, occurred in the buccal mucous membrane. The second papillary lesion was described as an intraductal papilloma or a papillary cystadenoma. The third papillary lesion occurred in the palate and was similar histologically to papillary cystadenoma lymphomatosum except for the absence of the lymphoid element.

The one malignant papillary tumor occurred on the palate. The tumor was similar histologically to the benign papillary tumor except for evidences of malignancy such as "party walls," anaplasia and invasion of adjacent stroma.

Fifteen were mucoepidermoid carcinoma. The tumor had the same histological appearance as those occurring in major salivary glands. In several instances these tumors were diagnosed clinically as salivary gland retention cysts or mucoceles.

Cylindromatous adenocarcinoma was the second most frequent malignant tumor in the series, the eight instances comprising 30 per cent of all the malignant tumors, 15 per cent of all the tumors. Three other adenocarcinomas were included in a group designated as miscellaneous. Two of these were designated as mucous cell adenocarcinoma. The third carcinoma in this group histologically was composed of sheaths of anaplastic cells some of which had vacuoles in the cytoplasm. This probably was a poorly differentiated form of the mucous cell adenocarcinoma.

The sites of distribution of salivary gland tumors in this series include the palate, upper lip, buccal mucosa, retromolar region, and the floor of the mouth. The palate lesions accounted for 59 per cent of all the tumors in this series. Six tumors were found in the lips, all involving the upper lip. The eight tumors that occurred in the retromolar region were all malignant. The median age of all patients in this study and the time of discovery of the lesion was 45 years. They ranged from 17 to 90

years. Tumors were more common in women. The follow-up information of the patients in this series was limited.—*Irwin A. Small.*

■ EXTERNAL LARYNGOCELE. John DeRosario, M.D.; Peter A. Nelson, M.D.; Herbert T. Nash, M.D., and Robert L. Schmitz, M.D. A.M.A. Arch. Surg. 78:422 March 1959.

Virchow in 1867 gave an accurate description of laryngocele. Since that time approximately 100 cases have been reported; about 70 per cent are internal, 25 per cent of the external and 5 per cent of the combined variety. Internal laryngocele may cause hoarseness and obstructive dyspnea, or both, but the external type is usually asymptomatic. The external cyst does not fluctuate in size. Roentgenograms will show the gas-filled cyst. These films are so pathognomonic that they should be ordered in every case of cervical mass. The laryngocele is located between the true and the false vocal cords. In any action which produces repeated elevation of intralaryngeal pressure (coughing, playing of wind instruments) the pressure is transmitted to sacculus, which may dilate to form the laryngocele. Internal laryngoceles are removed through the endoscope or by thyrotomy. External laryngoceles are approached through the lateral neck and are amputated at the thyrohyoid membrane. An example of this is presented.—*Martin F. Anderson.*

■ DISCRIMINATE ANTIBIOTIC PROPHYLAXIS IN ELECTIVE SURGERY. E. J. Pulaski. Surg., Gynec. & Obst. 108:385 April 1959.

A problem which always confronts a surgeon in clinical practice is the occurrence of new infections during the patient's stay in the hospital. When such infections occur they are predominantly, but not exclusively, staphylococcal; other causal bacteria are hemolytic streptococci, gram-negative bacilli, yeasts, and fungi. Infections, when they occur, commonly involve the subcutaneous tissues of the incision or skin in the operative field, the respiratory tract, the gastrointestinal tract, or the urinary system. The infection may be local, locally invasive, or may enter the blood stream and metastasize to bones, kidneys, or heart. Other factors which appear to increase the susceptibility of surgical patients to hospital acquired infections are severe metabolic disturbances, steroid therapy, extension of operative treatment to poor risk, aged, or debilitated patients, more complicated procedures, prolonged indwelling venous catheters, serious organic disease, and irradiation therapy.

The logical desire of the surgeon is to prevent these and other infections from the time of the patient's admission to the hospital until after the period of convalescence. Prophylactic antibiotic therapy has been highly successful in protecting the patient from invasive infections in certain selective situations; for instance, from further attacks of rheumatic fever; from subacute bacterial endocarditis in patients with valvular or congenital heart disease, undergoing surgery in a contaminated field, or in infants with congenital anomalies, and in protecting the patient in the presence of chronic obstructive emphysema. The extension of the practice of antibiotic prophylaxis from these known and proved situations to a "routine" for all surgical risks has become a widespread practice. The old cliché that antibiotic prophylaxis or treatment might do some good and cannot do harm is now untenable. Each surgeon has had some personal experience with anaphylactic or toxic reaction as well as superinfections induced by drug usage, not to mention the failures and disappointments arising from the use of antibiotics as the first line of defense against infections in surgical practice. Recent experience suggests that the drug-resistant microorganisms in the environment colonized the respiratory tree and skin more frequently in antibiotic-treated patients than in those untreated.

The fundamental aims of discriminate antibiotic therapy and the elective surgery are two: (1) to eradicate accidental hemolytic streptococcal infection by the use of a streptococcicide drug in those situations in which the infection is already present in a contiguous region such as the nose or throat, or is impending in the wound, and (2) to reduce the

numbers of bacteria in those structures of the body, naturally and heavily seeded by microorganisms, to a level compatible with local and general tissue resistance when operative procedures involved these and contiguous structures.

The several reasons against routine use of antibiotics are listed as well as an outline of surgical procedures which may require antibiotic therapy.—*Irwin A. Small.*

■ Lymphangioma of the Lower Face and Neck Involving Mandible. David W. Robinson, M.D. Plast. & Reconstr. Surg. 23:187 Feb. 1959.

An unusual surgical problem of a growing lymphangioma, diffuse and cystic, involving the tongue, floor of the mouth, cheek and upper neck, producing macroglossia, prognathism, open bite, and facial hypertrophy and asymmetry with complications from infection, bacteremia, pneumonia and atelectasis, and with dysfunctions of speech, deglutition, occlusion and respiration warrants discussion of past, present and future management.

A fundamental congenital dysplasia of the lymphatic system becomes a progressively growing and expanding mass of endothelial buds which grow into normal structures, secrete lymph, and enlarge into multicystic masses which replace normal tissue. Infections in the abnormally draining lymphatics occurring with common colds or sore throats may not be controlled as by a normally functioning lymphatic filter system, but may cause great swelling in the cystic locules with high fever, dysphagia, respiratory obstruction and even septicemia.

Many types of treatment have been recommended for lymphangioma of the cystic type; surgical excision, most commonly accepted, primary radiation, and injection of a sclerosing agent.

In this case treatment by surgery has of necessity been by partial excision on four different occasions. Macroglossia was reduced by large median and lateral wedges. Radiation therapy, although not extensive, caused little or no regression. Bleeding with excessive salivation is still present. Speech is understandable but only fair because tongue movements are limited.

Pneumonia was a complication of the third operation even with a tracheotomy tube. Infection was serious after the first operation. Open bite is present. Further reduction will likely be necessary to recess the mandibular incisors and correct the open bite.

Although further local mechanical reduction of residual tumor in the left cheek may be attempted, it is fraught with the danger of paralysis from lack of identification, or necessary destruction of muscle or nerve. Such procedure should be conservative.—*Donald B. Rae.*

■ The Role of the Lack of Oxygen in Irreversible Cardiac Arrest. S. Frank Redo, M.D., and D. Yvonne Porter, B.S. Surg., Gynec. & Obst. 109:431 Oct. 1959.

The effects of oxygen free-, substrate free-, and oxygen-and-substrate free-Ringer's solution on the mechanical and electrical activity of the isolated, perfused guinea pig heart have been evaluated and compared with the effects of complete cessation of perfusion fluid inflow. Recovery after perfusion with oxygenated Ringer's solution without dextrose occurred in all instances, but maximum return of amplitude of contraction was only 56 per cent of initial values. After perfusion with unoxygenated Ringer's solution without dextrose, recovery occurred in but 3 of 9 hearts, with maximum of amplitude of contraction to 31 per cent of initial values.

The difference in mechanical recovery and electrical response in the cases of cessation of perfusion fluid inflow suggests a different mechanism of arrest. This is considered to be based on the accumulation of endogenous potassium resulting from changes in cellular permeability. This type of arrest is reversible whereas arrest achieved by lack of oxygen, substrate, or both, is irreversible and results from cellular exhaustion. Results indicated that the lack of oxygen is more important than the lack of substrate in producing irreversible cardiac arrest.—*Irwin A. Small.*

■ OPEN REDUCTION OF MANDIBULAR CONDYLE. A CLINICAL AND EXPERIMENTAL STUDY. J. H. Hendrix, Jr., M.D.; S. G. Sanders, D.D.S., and Byron Green, M.D. Plast. & Reconstr. Surg. 23:283 March 1959.

In fracture dislocations and some fracture displacements of the mandibular condyle, it is the opinion of many that open accurate reduction definitely is indicated. However, it has been the impression of most that there is danger of condyle necrosis if muscle fibers on the medial side are stripped. In view of the good blood supply, it would appear that the condyle would be revascularized readily and thus be in little danger of undergoing necrosis. In some instances it is simple technically to remove the condyle and reinsert it after wires have been placed through drill holes.

The procedure is thus: (1) arch bars are applied to the teeth; (2) the condyle is removed completely and also the meniscus if it is torn; (3) holes are drilled through the distal or inferior end of the removed condyle and the proximal or superior end of the neck; (4) a stainless steel wire is placed first through the neck, inferior to the fracture site, and then through the hole in the condyle superior to the fracture site; (5) the condyle is inserted fracture line first and the wire tightened; (6) if the condyle has any tendency to be displaced medially, it can be secured with a catgut suture around the zygomatic arch; (7) elastic traction is applied to arch bars to maintain firm centric dental occlusion.

Since September 1955 the technic has been used on eight patients. No permanent complications were encountered. All instances have obtained an excellent result with normal occlusion and a good unrestricted range of motion.

This procedure was carried out successfully on dogs and histologic studies done, revealing viable condyles, good healing of the fracture sites, coverage of articular surfaces with smooth, almost normal appearing sheets of fibrocartilage.—*Donald B. Rae.*

■ USE OF TEFLON MESH IN THE REPAIR OF MUSCULOFASCIAL DEFECTS. L. G. Ludington, M.D., and E. R. Woodward, M.D. Surgery 46:364 Aug. 1959.

The ideal fascial substitute has yet to be found. Such a substance should be: (1) biologically nonirritating to tissues; (2) of inorganic nature; (3) easily sterilized and not altered by sterilization; (4) chemically inert in tissue fluids; (5) pliable and nonrigid so as to adjust to tissue movement; (6) strong enough to withstand local stress; (7) nonelectrolytic; (8) not subject to fragmentation or becoming "work-hardened"; (9) available and inexpensive; (10) nonhygroscopic; (11) not opaque to roentgenography, and (12) should have the ability to maintain itself and become incorporated by connective tissue despite the presence of infection, as long as there is adequate drainage.

Teflon is the most inert of the plastic material studied to date. It is stabile against hydrolyzing and oxidizing agents and its wettability is nil, preventing its deterioration in tissue fluids. Implantation in body tissues for up to one year reveals no loss of strength, and Teflon fabrics can be prepared easily for surgical use by washing in detergents to remove plasticizers and can be autoclaved as many times as necessary. The Teflon mesh must be loosely woven to allow quick and complete incorporation with fibrous tissues.

The authors have followed 26 patients in whom Teflon has been used for from 6 to 12 months. It is their opinion that Teflon is a promising fascial substitute, superior to other plastics and having many advantages over tantalum mesh. These advantages are its ease of handling, its availability and low cost as compared with tantalum, its proved strength in body tissues over long periods without chemical deterioration or fragmentation and its inertness to body tissues which equals that of tantalum. In case of reoperation, Teflon need not be removed as would be the case with tantalum, and it is nonopaque to roentgenography. —*Myron Kaufman.*

Announcements

■ Forty-second Annual Meeting of the Society of Oral Surgeons

The formal meeting of the American Society of Oral Surgeons, scheduled for October 12-15 at Phoenix, Ariz., will be preceded by several extra-meeting events. A golf tournament will be held October 10 at the Phoenix Country Club Monday under the chairmanship of Charles E. Borah.

On Tuesday, October 11, a conference on oral cancer will be held under the chairmanship of Harold E. Krogh. Motion Picture Night, directed by Paul E. Hamilton, will be held that evening.

The annual cocktail party this year has been moved to the opening night of the sessions in order to give new members an opportunity to meet everybody.

■ American Academy of Dental Medicine Awards Honor to Hans Selye

Hans Selye, director of the Institute of Experimental Medicine and Surgery at the University of Montreal, will be the first recipient of the Samual Charles Miller Memorial Award, it has been announced by the American Academy of Dental Medicine.

The noted author of the general adaptation syndrome concept will receive the award in recognition of his significant contributions to the art and science of dental medicine. It will be presented to him at the Academy's fourteenth annual meeting to be held May 27-30 at the Warwick Hotel, Philadelphia.

■ Emory Dental School Offers Residency in Oral Surgery

In cooperation with the Emory University Schools of Dentistry and Medicine, approved two year residencies in oral surgery are available at the Atlanta Veterans Administration Hospital and Grady Memorial Hospital.

The residencies are approved by the Council on Dental Education of the American Dental Association and are recognized and accepted toward the partial fulfillment of American Board of Oral Surgery requirements.

Further information can be obtained from H. J. Harpole, professor of oral surgery, Emory University School of Dentistry, 106 Forrest Ave., N.E., Atlanta 3, Ga.

■ Graduate Education at the University of Oregon Dental School

The University of Oregon Dental School announces a program of graduate education leading to the Master of Science degree in anatomy, bacteriology, oral pathology, biochemistry, pedodontics, pharmacology and physiology.

Only qualified individuals who intend to make dental teaching and research a career will be considered. Financial support, provided essentially by the National Institute of Dental Research

of the Public Health Service, will vary from $4,000 to $5,500 per year, depending on individual qualifications and responsibilities. At the present time this support is available only in the departments of anatomy, bacteriology and oral pathology.

Further information can be obtained by writing to: Dr. Norman H. Rickles, department of oral pathology, University of Oregon Dental School, 611 S. W. Campus Dr., Portland 1, Ore.

■ Courses in Oral Surgery Offered at the University of Illinois

The College of Dentistry of the University of Illinois is accepting applications for two and three year full-time courses in oral surgery beginning in July. Further information can be obtained from Dr. Daniel M. Laskin, department of oral and maxillofacial surgery, University of Illinois, 808 S. Wood St., Chicago 12.

■ New Headquarters for American Society of Anesthesiologists

Formal dedication of the new headquarters building for the American Society of Anesthesiologists will take place May 21. The building is located in Park Ridge, Ill.

The ASA is now officially a member of the World Federation of Societies of Anesthesiologists and as such will have a delegation at the September World Congress in Toronto.

■ Sites of 1960 Gordon Research Conferences

The Gordon Research Conferences on chemistry, physiology and the structure of bones and teeth will be held July 11-15 at the Kimball Union Academy, Meriden, N. H. Other Gordon Research Conferences are held during the summer up to September 2 at Kimball Union Academy, Colby Junior College, New London, N. H., and New Hampton School, New Hampton, N. H.

■ American Association for Cleft Palate Rehabilitation

The annual meeting of the American Association for Cleft Palate Rehabilitation will be held May 12-14 in Denver. Further information can be obtained by writing to D. C. Spriestersbach, University Hospitals, Iowa City, Iowa.

■ Berkshire Conference to be Held June 19-23 in Lenox, Mass.

The eleventh Berkshire conference on Oral Pathology and Periodontology will be held June 19-23 at Lenox, Mass. Those interested can contact I. Glickman, Tufts University, School of Dental Medicine, 136 Harrison Ave., Boston 1.

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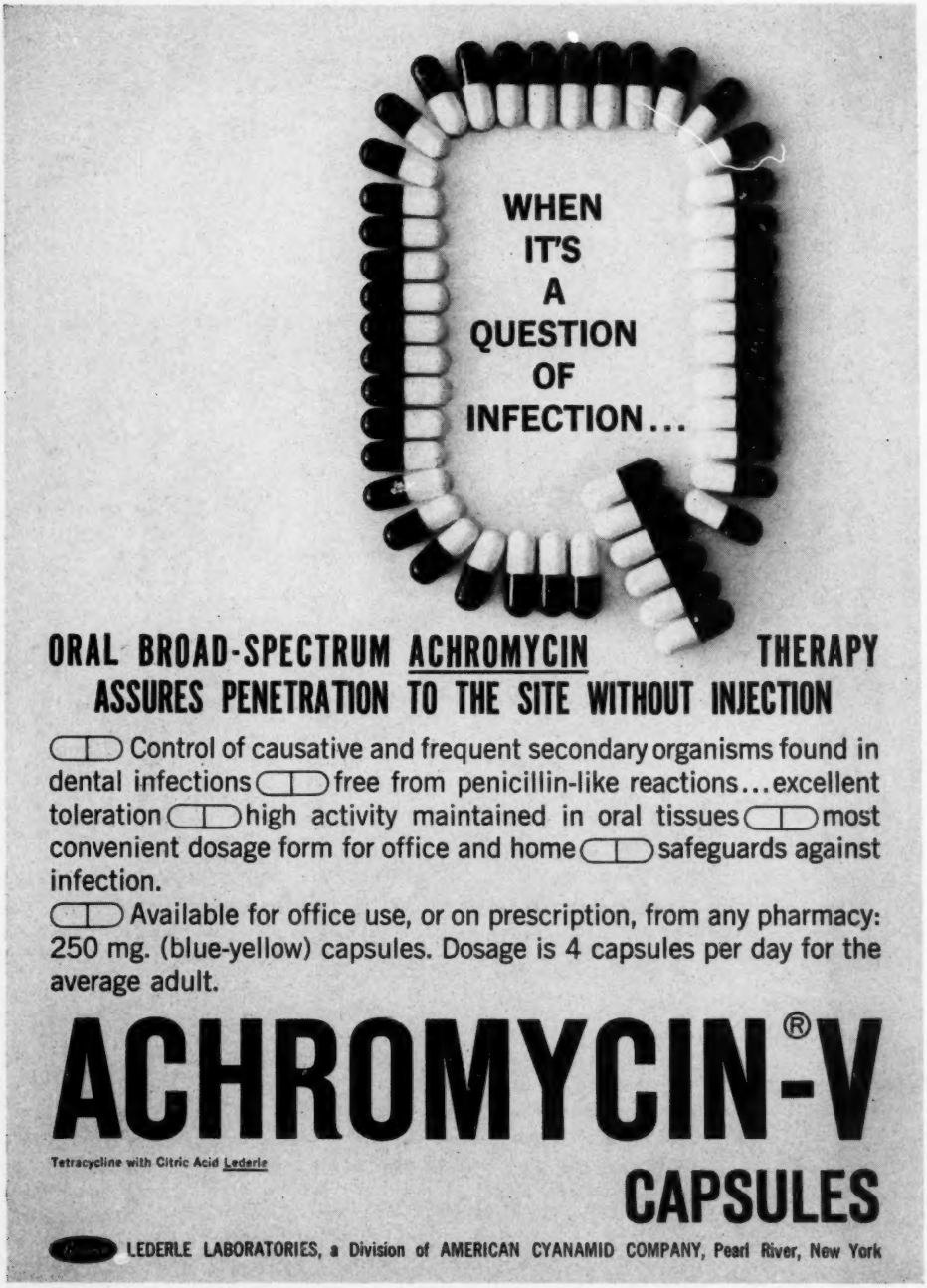

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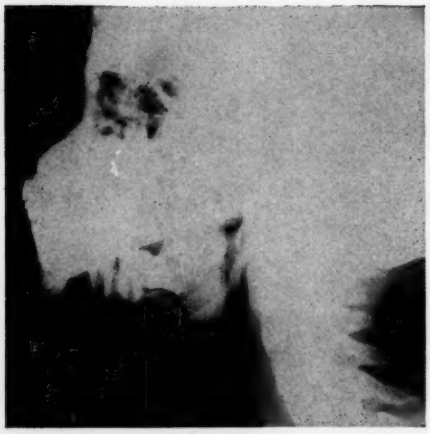

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